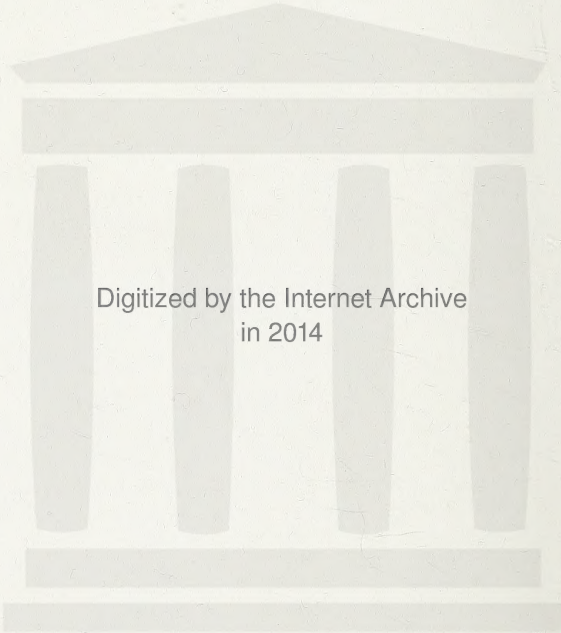
YEAR BOOK OF THE HEATHER SOCIETY

1981



THE HEATHER SOCIETY

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Gesellschaft der Heidefreunde
Pacific Northwest Heather Society

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CONTENTS
Volume 2 No. 10

Editorial

Heather enthusiasts face a special dichotomy. The Heather Society has long deplored the irresponsible naming of cultivars and yet it goes on apace - I now know of nine yellow foliage clones of *Erica carnea*, and venture to doubt if they are all sufficiently distinct to warrant cultivar names. However, few of us could practice the extreme asceticism preached recently by Roy Hay in *The Times*, where he wrote that twelve cultivars of flowering cherry and *Rhododendron* provide "ample choice". The Technical Committee of the Society has held protracted discussions on a preferred list of cultivars, and at last the debate seems to be drawing to its conclusion, but the resulting list is over five times as long as Mr. Hay's in those other two genera.

I suspect many of us agree with an entry in Tradescant's Diary in *The Garden* for October 1980 which deplores the reduction in the number of cultivars of all genera offered by most nurseries and garden centres. Few would wish to see the older heather cultivars disappear. The Society is active on this front too and the establishment of the National Reference Collections at Wisley and Harlow Car will ensure that worthwhile cultivars will be preserved.

The response to my appeal in the Summer Bulletin for material was most gratifying and as a result some new names appear among the familiar ones on the contents page. I thank everyone who has contributed to this Year Book, but I would still ask you to note and act upon the Chairman's remarks which appear elsewhere in it.

With so many good articles it seems invidious to single out one author for special mention but I feel I must do so. Mrs. Parris has often contributed to these pages. Those of us who have met her at various Annual Conferences have been charmed by her enthusiasm and her impish sense of humour - she it was who suggested laundering bees prior to using them in hybridisation

experiments. I am sure she will excuse me if I say that in years, if not in spirit, she has passed the first flush of youth and yet she is setting off to start a new heather garden in Australia. In this issue she writes her own valediction. All our good wishes go with her. We shall miss her.

From the Chairman.

Maj.-Gen. P. G. Turpin, C.B., O.B.E.,
West Clandon, Surrey.

In a Society like ours, in which the members are so widely dispersed - thousands of miles apart in the case of our overseas members - it is inevitable that we should have some difficulties in communication. We can only fit in one week-end Conference each year, but by arranging the venue in different parts of the country we try to keep in touch with as many members as possible. All our members receive the Year Book and the Bulletin. These publications provide an opportunity for an exchange of ideas and a pooling of experience. If we are to get the best value from them, it is important that their contents should reflect as wide a cross-section of the membership as possible. We would like many more of our members to send in their contributions, so that we can all share each other's experiences. The shortest of notes can be of value.

The vitality of the Society depends, to a great extent, on the activities of the Group Organisations. Only a limited number of members can come to the Annual Conferences or the Shows in London, at which the R.H.S. Heather Competitions are held, when the Heather Society stages its own display. But it is not difficult for local Groups to organise an interesting programme of visits and meetings within the reach of all members belonging to a particular group. A successful programme depends largely on the enthusiasm of the

organisers. Some of our Groups are very active and provide their members with an interesting programme throughout the year. Others, regrettably, are less active or even dormant. We would like to see flourishing Groups throughout the whole range of our membership. So, I appeal to those members who feel that they can spare a little time and energy on organising meetings in their area to come forward and let the Hon. Secretary have their names and addresses. After all, the well-being and ultimately the future of any Society depends on the interest and enthusiasm shown by its members.

Queen Margaret's College, Edinburgh, 1980 -

Molly Boxall, Kingswood, Surrey

Blown in from all quarters by a gale, we were warmly welcomed by the Scottish zone and Mrs. Puck Duvall to a delightful residence which was to be our home for the weekend.

Quickly resuscitated by a super supper, we were shown slides of scenery and mountain flowers of Scotland by Mr. Aitken of Orchardbank Nursery, Perth - such exquisite photography - quite breathtaking - flowers that many of us hardly knew existed, let alone had seen! He is certainly "photographer extraordinare".

Sunshine greeted us next morning - all tales of our journey exhausted, we gathered for our usual hilarious photograph of the Heather Belles and Beaux! Then on to the serious business of the AGM, through which our Chairman, Maj.-Gen. Pat Turpin, guided us with his usual skill. We were then introduced to the Gardens of the National Trust for Scotland, with a beautifully illustrated talk by Mr. Robson, who is the Garden Adviser.

After lunch we travelled by coach to Tyninghame Gardens - the magnificent home of Lord Haddington, who personally conducted us round his estate. In its

heyday it must have been a dream, but now only two gardeners are left to cope, and still it is a joy. Rain unfortunately rather marred our visit. The evening was made most enjoyable by an Open Forum and many tricky questions were expertly sorted out by our Chairman and Bob Brien, Bert Jones and David Small - quite a team !

Sunday started with more rain, but in spite of it we rushed to admire, and purchase some of a splendid collection of heathers, dwarf conifers and gentians etc. which Mr. and Mrs. Sturrock had so thoughtfully brought with them - we were like bees round a honey-pot. Also Bob Brien again kindly produced some of his plants from St. Kilda. Then to the Lecture Theatre where Mr. Evans, Assistant Curator of the Royal Botanic Garden, enchanted us with a splendid and instructive illustrated talk on Ericaceae, followed by Mr. McBeath, who is in charge of heathers at the Garden, showing us lovely slides of his treasures. What a lot we learned from these two specialists. Sunday lunch was as delectable as any home lunch, watched over by three chefs and their team of charming waitresses.

No time for resting ! Off we went to the Royal Botanic Garden to be met by Mr. Evans and Mr. McBeath who personally escorted us and introduced us to much of the wonderful collection of trees and plants. It is indeed a superb garden - 70 acres, 70 gardeners - surely one of the finest to be found and not to be missed when visiting Edinburgh. We returned to the College for the closing speech by our tireless Chairman, who thanked the Scottish Zone and everyone who had contributed to an excellent Conference. For most of us it was an early night before we travelled home with renewed enthusiasm to try to improve our own heather gardens.

Growing Heathers at the Sussex Coast

John W. Gillespie, Sutton, Surrey

The steep slope of the lawn, at the lowest side of which there was a three foot drop over a brick retaining wall, caused some apprehension each time the lawn was cut.

In 1974 it was decided that, if the turf was removed and a bed of heather planted, the possibility of a nasty accident would be reduced, and some additional colour given to the garden. The turf at the northeast corner was lifted, leaving a right-angled triangular area with the base about 19 feet long nearest the top of the brick wall. The result of this turf removal was to confirm that at some earlier period in history the sloping garden had been part of a sandbank at the side of a river which had subsequently been diverted. However in the absence of any previous experience of such a situation it was believed that, if peat was incorporated into the sand, a suitable heather growing mixture would result.

No accurate records of quantities were kept at that time, but a liberal amount of peat was applied when the ground was dug over, and, because it was believed to be required, sulphate of ammonia was also added. In the winter of 1974/75 the ground remained fallow and any weeds that appeared were destroyed. On 21st March after the recommended spacing for each individual heather had been plotted on graph paper, a dozen plants each of *Erica carnea* 'Springwood Pink', *E.* x *darleyensis* 'Darley Dale' and 'Silberschmelze' and *E. vagans* 'Mrs. D. F. Maxwell' were put in.

In the following month it was thought just possible that the whole operation had been a waste of time, money and physical effort, so a full confession of what had been done was sent to Wisley along with a soil sample. In their reply our good friends said the pH reaction was 5.5 and they suggested the application of 3oz. of Growmore per square yard and a further mulch of peat when the weather became milder. These suggestions were meticulously followed during the second week in May.

In July of that year some plants appeared to be less healthy than they should have been so they were lifted, soaked in water and, after untangling their roots, were replanted (ref. Frank P. Knight - Wisley Handbook - Heaths and Heathers). By September some plants were so obviously ailing that it was decided to replace five of the *E. carnea* 'Springwood Pink', five of the *E.* x *d.* 'Darley Dale', four of the *E.* x *d.* 'Silberschmelze' and nine of the *E. vagans* 'Mrs. D. F. Maxwell' with new plants of the same cultivars.

Does any gardening enthusiast require to be reminded of the drought of 1976 or cannot imagine the havoc caused to the beautiful heather bed ? The water level under the sand dropped, the sand compacted and the copious supply of hosed water ran over the surface taking with it any loose peat that lay in its way. The roots of several heathers were laid bare and the sun and wind completed their early deaths.

Any attempt to carry out the original carefully planned lay-out of a heather bed just had to be abandonded and an alternative method of solving the problem of how to grow heathers had to be found. The lowest side of the bed was about nine feet higher than the nearest point where a barrowload of stones could be wheeled, and the load then manhandled up two flights of stone steps. Senile decay and discretion ruled that idea out. Peat blocks were also considered, but further adding to the already quite considerable expenses incurred seemed unwise at this experimental stage.

Finally it was decided to provide each plant with its own little patch, and treat it as if it was growing in a pot. Strips of metal available for edging lawns and about five inches wide were cut into pieces 15 ins long. These were pushed into the ground about halfway round each heather at its lower side and some peat was used to give the plant a level area around it. When the rain fell or some hosing was done, channels appeared where water

was missing the catchment areas. These diversions were not included in the experimental plan, so further strips were pushed in to direct the water to where it was required.

Now in 1980 those plants which have survived the initial problems have become established and flourished. The edging strips have greatly helped, and such has been the growth of the plants that all the strips are completely obscured. Some day all the setbacks may have been forgotten, and taking courage in both hands, the edging strips will be removed with no disastrous results.

Thoughts on an Ageing Heather Garden

Dr. Violet Gray, Hindhead, Surrey.

There cannot be many members of our illustrious Society who possess over an acre of heather garden more than 25 years old. So I thought it might be of some interest to recent members to be forewarned of what the future holds in store for them if they and their plants survive that long.

My husband and I started this garden in 1950 from scratch (literally as far as the gorse was concerned). The area was wild heathland with a lot of bracken, pines and birches, and a little heather.

For the first five years my husband was very busy taking cuttings from specimen plants we brought from our previous heather garden. As he normally had 100% success with cuttings the area planted grew rapidly so the great majority of my plants are more than 20 years old.

Many experts say that heathers must be replaced every 10 to 12 years but most of mine are still blooming freely. They have been clipped every year (except the carneas) so they have not been allowed to get leggy. However in time some of them become too woody to clip

and must be replaced. It is always a sad decision to make, when the time has come, to dig up large areas of old heather which is still making a brave effort to flower on old stems. It seems somehow disloyal to old faithful friends that have outgrown their usefulness, but it has to be faced. On the bright side, there are now bare patches which can be planted with some new and exciting varieties.

The year of the drought certainly precipitated the demise of some old plants, although others withstood it remarkably well, having very extensive root runs. At the other extreme of climate, heavy snow breaks down tall heathers especially tree heathers, which although they may recover, are sometimes left in an ugly shape. Tree heathers have a splendid power of recovery from frost which splits the bark, and from snow damage, but some are left much disfigured and must be replaced.

In other parts of the garden healthy exuberant patches of heather spread themselves across my paths, sometimes extending more than 12 inches from the nearest roots. When the paths thereby cease to function as such, a great plague of healthy heather has to be cut away, another painful surgical procedure. This is, of course, lovely propagating material for anyone with the time or energy to spare, for it will afford literally hundreds of cuttings and it is sad to see them wasted.

There is also encroachment of another kind from the natural vegetation of the area. Common heather seeds itself freely but can easily be weeded out when in bloom. If not, being more sturdy than many of the cultivars, it can smother them. Bilberry is another enemy to the heather garden. It is a natural ground cover and has to be forcibly restrained from growing up into the patches of heather. During the drought I had to stop pulling out the bilberry suckers to avoid disturbing the heather roots, but one year's reprieve gave them all the impetus they needed to get beyond control. The autumn gorse must also be kept in check. I think it enhances the beauty of the heather garden, giving yellow patches among the pinks

and purples, but it would soon take over most of the ground if not controlled. Last, but by no means least, are the pine trees. They seed themselves prolifically and grow fast. The young seedlings are easy enough to weed out, but I like to keep some to improve the contour of the garden. However before you are aware of it they have grown large enough to spoil the vista instead of enhancing it and are giving too much shade. Most experts agree that most heathers, except the golden foliage varieties, will tolerate a little shade, but not that of forest trees. So there comes a time when trees have to be felled, which is always a traumatic event.

I think I have dwelt long enough on the problems of my garden. A mature, or even a post-mature heather garden has a charm of its own. There are large patches of differing shades of pink, white and mauve coalescing and running into each other. It is a pretty sight to see heathers climbing over each other and up brooms or small pine trees. *Erica vagans* and Daboecias especially can be seen blooming 18 to 24 inches from the ground.

The more vigorous varieties tend to smother their weaker brethren in time, and unless you are watchful you may lose a less vigorous grower, but mainly they intermingle very happily.

Although my garden does not produce any fine individual specimens (except for the newly planted patches) and I admit that I sometimes envy the magnificent heathers that my fellow members produce for the R.H.S. Show, there is great charm in the general patchwork. It is more akin to heather growing naturally in the wild than are heather gardens more recently planted.

I shall try to retain enough patches of old friends to keep the character of my garden unaltered.

Conifers With Heather

Harold Street, Chipping Campden, Gloucestershire.

A friend of ours walking round the garden in July was admiring the pale golden foliage of a *Chamaecyparis pisifera* 'Filifera Aurea' and thought how well it looked surrounded by bronze-red *Erica carnea* 'Ann Sparkes'. I was glad to hear this because in early spring the brilliance of the conifer's new foliage seemed much too dominant and I had wondered whether to move it. Of course that would have been foolish because it soon tones down a little without losing its charm. He also noticed that 'Ann Sparkes' leads into a drift of *E.c.* 'Aurea' and he liked the way this group related to a two metre specimen of *Thuja occidentalis* 'Aurea Nana' then in its full glory of gold and green. The golden carneas wind on between Erigenas and *Erica* hybrids, embrace a single plant of *E. vagans* 'Valerie Proudley' (whose yellow foliage we find more at home here than with her closer relatives), and come to an end alongside the warm gold of a *Thuja occidentalis* 'Rheingold' as yet only a metre high.

The same bed includes other varieties of *Erica carnea* as well as several plants of *E. terminalis* (species) and *E. t.* 'Thelma Woolner' which do so well on our alkaline soil. Among these are a number of conifers of varying size, shape and colour.

This note has been prompted because the necessarily brief report in the 1980 Year Book of the talk I gave on Design for Heather at the Weymouth Conference has given some readers the impression that I decried the use of conifers with heather. Very far from it. What I deplored was the misuse of conifers, which in my view is not uncommon, and the assumption in some publications that conifers should be included in every heather bed. Specific recommendations are usually

admirable, but in practice from time to time one finds ill-chosen specimens looking very much out of place. This is a pity because we all know how effective the combination can be.

Conifers offer such a great variety of colour, texture, shape and size that care in their choice is well repaid. The dwarf kinds are usually delightful - but beware: many a purchaser has been assured that his plant will not exceed a certain height and then found, a few years too late, that it never seems to stop growing ! The thing to do, obviously, is to buy only from a trustworthy source. Even so one can have surprises. A *Juniperus communis* 'Compressa' we had from Joseph Sparkes more than ten years ago has now doubled its height to 35 cm. We bought another one eighteen months ago from a well-known nursery. It was already almost the size of the first one. No doubt significantly the foliage was somewhat less fine but this summer it has grown half as big again while the first one has hardly budged. We are leaving the label on for the time being !

Before buying the bigger kinds one should find out what the 'ultimate height' is likely to be. Too often this is overlooked, and in due time reluctance to remove a fully grown tree leaves a garden out of balance. Early pruning can help to control growth of course and the experts advise little and often for the best results. They also say that increases in size can be checked indefinitely by lifting and replanting every two or three years. But if you do this remember not to let them dry out at the roots.

Besides associating well together, conifers and heather share the virtues that they are well behaved, reasonably trouble free and labour saving. In these hard times that must be good !

"Red-hot in summer, freezing in winter, is that big, purple heather country of broken stone".

Rudyard Kipling, *Puck of Pook's Hill.*

Heather Gardens No. 7
The Royal Horticultural Society's Gardens, Wisley.

Maj.-Gen. P. G. Turpin,
West Clandon, Surrey.

The Heather Garden in the Royal Horticultural Society's Garden at Wisley should, by rights, have come earlier in this series, because it was one of the first places where such a garden was created as a special feature. There had been a great vogue for growing Cape Heaths in glass-houses and conservatories both in this Country and on the Continent at the beginning of the 19th century, following the expeditions of Francis Masson, sponsored by George III, to South Africa in search of new species. Over 300 varieties were listed by nurserymen in London. *Erica carnea* was popularised by the firm of Backhouse early in this century for its great value as a winter-flowering plant. But the other hardy heathers were not widely grown until the mid-twenties, when Maxwell and Beale started collecting new varieties for sale from their Dorset Nursery.

This was the time, just after the first World War, when the seven-acre plot at Wisley, bordered by the river Wey, was being developed and it was decided to make a heather garden, which would give colour all the year round.

Seven Acres, as the area is still named, consists, like most of Wisley, of very light sandy soil, which dries out rapidly, but does not retain any warmth. In cold weather temperatures at Wisley are at least 5°F lower than they are on less sandy soils only 5 miles away. In order to grow heathers satisfactorily large quantities of humus are regularly dug in and generous mulches of leaf-mould and pulverised bark applied to the surface of the beds. In dry weather frequent watering is necessary to prevent the roots from drying out. Fortunately Wisley has its own source of water in the river Wey.

You can approach the Heather Garden from the Wild Garden, over the lawns from the Walled Garden past the Round Pond, or from the Restaurant past the Lake. Whichever way you choose you will pass many specimen trees, *Acer griseum*, the tulip tree (*Liriodendron tulipifera*), the variegated Turkey oak (*Quercus cerris* 'Variegata') and the graceful willow-leaved pear (*Pyrus salicifolia*). In the autumn the colour effects of the area are enhanced by the flaming foliage of *Liquidambar styraciflua, Nyssa sylvatica* and the oaks. On a small island in the Lake there is a tall specimen of *Metasequoia glyptostroboides* which is beautifully reflected in the water with the great leaves of *Gunnera* and the red-stemmed *Cornus*.

The Heather Garden itself is on a completely flat piece of ground and great care has been taken to avoid too monotonous an appearance by the use of irregular-shaped beds with winding paths and by varying the height of the plantings, in order to provide a vertical dimension. By this means the important element of surprise has been achieved in a comparatively small area. Scots pines, silver birches and rowans, all natural companions of heather, have been used to good effect. The five Scots pines date from the earliest days and were planted in 1922.

In each of the five island beds the heathers are set out in generous groups of fifty or more, in order to display fully the character of each cultivar. Among them are planted pernettya and other acid-loving shrubs and a selection of conifers, which give depth to the overall colour effect with their various shades of grey and green.

All the commonly grown hardy species are represented, including *E. scoparia* and its dwarf cultivar *E. scoparia* 'Minima'. There are a number of venerable Tree Heaths which give substance to the plantings and provide backgrounds for the lower-growing species. Chief among them is *E. arborea* 'Alpina' with its rich green foliage all the year round and its clusters of tiny white flowers from April to the beginning of June. This is

the hardiest of the Tree Heaths and is never affected by cold weather at Wisley. *E. australis*, in both its pink and white forms, and *E. lusitanica* and the golden variety 'George Hunt' add their contribution in the spring; and there is an unusual clone of *E.* x. *veitchii*, which is hardier than 'Exeter' and grows to a height of over ten feet. The plants of 'Exeter' which had survived the cold winter of 1962/63 could not withstand the conditions of 1978/79, when icy winds with little snow cover followed a deceptively mild early winter.

Close to the island beds, along one side of the lake, there is a fine collection of low-growing and prostrate conifers inter-planted with winter-flowering heathers, mostly *E. carnea* 'King George' and 'Springwood White', with some patches of *Bruckenthalia spiculifolia*, the Balkan Heath. An unusual combination is 'Springwood White' growing right through a specimen of the prostrate *Tsuga canadensis* 'Minuta'. Between this collection and the lake is a memorial seat, simply inscribed "For Heather".

A heath garden of this sort needs regular replanting to get the best effect from the heathers. Although some species can be left for many years without much sign of deterioration, a phased replacement programme is necessary if the heathers are to be shown at their best. Such a programme makes it possible to introduce the most promising of the new cultivars as they come along, and Wisley is often the first place where the public can see them and judge their performance. Plants submitted to the R.H.S. Floral Committee 'B' for an award are often recommended for trial at Wisley before the Committee makes its decision. *E. mackaiana* 'Dr. Ronald Gray', *E. lusitanica* 'George Hunt', *E. carnea* 'Altadena' and *Calluna vulgaris* 'Kinlochruel' and 'My Dream' were all sent to Wisley for trial.

Among new cultivars which have recently been planted are the double *Calluna* 'Mrs. E. Wilson', which is very similar to 'Tib', and the single white 'Snowflake', which has a habit reminiscent of 'Alba Rigida' - both from the United States.

Seven Acres is not the only part of Wisley where heathers are grown. Some of the carneas and darleyensis hybrids help to provide winter and early spring colour in the Rock Garden and *E. lusitanica* revels in the conditions there, seeding itself in the most unlikely nooks and crannies. *E. terminalis* may be seen growing among rhododendrons on Battleston Hill and *E. erigena* 'Irish Dusk' in the special garden devoted to winter-flowering plants close to the trials grounds in Portsmouth Field.

There is a fine clump of *E. arborea* 'Alpina', which must be over 40 years old, in the middle of Howard's Field, where the Heather Reference Collection will soon be taking shape. Here members will be able to see and compare authentic plants of as many of the named cultivars as can be collected.

It is fortunate that so many of the Directors and Staff of the R.H.S. Gardens have been (and are) heather enthusiasts and we can count on our President and the recently appointed Curator, Mr. John Main, to see that the Heather Garden continues to live up to the high reputation which it has for so long enjoyed.

The Gardens at Wisley are only 20 miles from London on the A3 (Portsmouth Road) between Cobham and Ripley and are open throughout the year (except Christmas Day).

"The grounde is baren for the moste part of wood and corne, as forest grounde ful of lynge, mores and mosses with stony hilles"

Leland

Book Review

McClintock, David

A Guide To The Naming Of Plants
Second Edition, Leicester, The Heather Society
37pp, index.
£2.50 including postage

To many people the names of plants are baffling. To have a concise, readable and easily understood book on the "problem" is therefore desirable, and this completely revised edition of David McClintock's *A guide to the naming of plants* meets all these requirements.

The author starts by defining the various categories used in plant classification - species, subspecies, section, form, among others. He does not confine himself to explaining strictly botanical categories, but also includes terms like cultivar (which should be used by all of us in place of "variety" when we mean a garden plant), clone, mutant and hybrid. There are short paragraphs on chromosomes, genes, types and even teratalogical forms. Mr. McClintock explains simply how a plant name is composed, what regulates these Latin names, and enters the "proverbial minefield" of correct names, capital letters for specific epithets and such like. In fact, this little booklet answers all the questions you ever wanted to ask about plant names but were afraid to. It is in his simple explanation of plant nomenclature, and the results of applying the rules of nomenclature, that the great value of *A guide* . . . lies for the amateur.

In part II, there is a useful and interesting commentary on the names of hardy heathers. Names with uncomplicated histories like *Bruckenthalia spiculifolia* (for which David invented an English name), those with quite tortuous histories like *Erica erigena* and *E.* x *stuartii*, and the ones that no-one can agree about like *Erica carnea* and *E. herbacea*, are gently explained.

In part III, the Heather Society's recommendations on cultivar names are laid out, starting with hybrids, and

giving the recommended form of the names. The booklet of 37 pages concludes with a select bibliography which is up-to-date, and a very comprehensive index covering 6 pages and including perhaps 450 items.

Despite the existence of the International Code of Botanical Nomenclature, which lays down the Rules for naming plants, botanists still dispute, and many of their arguments relate to interpretation of these rules. As well as Rules, the Code contains "Recommendations" which are not binding. So there remains the possibility of disagreement about the correct name for a plant.

In this respect, there are some aspects of McClintock's booklet which may strike a discordant note, or seem contradictory. For example, the author persists with his argument (which cannot be denied) that not to use a capital letter for the specific epithet commemorating a person "shows disrespect" - in the case, say of *Erica mackaiana*, one would hope that James Townsend Mackay was pleased that he was commemorated (quite unjustifiably) by that name. Is it not enough to be perpetually on the lips of members of the Heather Society? Yet we read that the recommendation of the Heather Society is that we should use *E. carnea* 'King George', not *E. carnea* 'King George V' - to some this may be more disrespectful ! However, this is regulated by another set of rules, the International Code of Nomenclature of Cultivated Plants.

Plant names, their uniformity and universality, are fundamental to botany and we must all strive to use the one correct name for each separate species. As the author remarks in his preface, the "Rules are our friends" and uniformity is in everybody's interest. This is not a reflection of a modern fashion for bland sameness, but a question of the ease of exchange of information world-wide. As McClintock points out, personal preferences should take second place, and this booklet should prevent people "pleading ignorance" as far as heathers are concerned. Alas too many people do ignore correct names or plead ignorance of them - some

nurserymen are prime offenders. This brings me to another apparent contradiction which is found in paragraph 27. There the plan for "horticultural equivalents" is explained (these were mentioned in the first edition but do not seem to have been published), which surely is at odds with the author's introductory remarks, and which he might have commented on. *

Changes in plant names can be confusing and may at times seem ridiculous, but we should follow the rules. The International Codes surely should be abided by without taking the "ostrich-like" way out and proposing "horticultural equivalents". That is not to say that when taxonomists cannot agree, as in the case of *E. carnea* - v - *E. herbacea*, some attempt at a rational compromise should not be made, but *please*, let botanists and horticulturalists agree on the *same* name. To allow exceptions to rules invites the same sort of "organised" chaos which makes the International Code such a cumbersome and impenetrable document. Horticulturalists and nurserymen really have no excuse for refusing to adopt the right name; we would all benefit if they did. But enough of sermonising !

We all owe David McClintock our gratitude for this new edition of the Heather Society's "Best Seller". It is compulsory reading for horticultural students in several well-known botanic gardens, and should be obligatory for all members of the Heather Society. The book is clearly set out, well printed and attractively presented. Is such a thin booklet worth £2.50 - a five-fold increase on the price of the first edition of 1969 ? The answer is a resounding YES ! Any member of the society who did not buy the first edition, and all those who did, should spend these relatively few pennies on the new edition. I hope it will stay in print, at least until the Rules have changed so much (hopefully for the better) that a rewrite is required, or until the day dawns when the problem of *Erica carnea/herbacea* has been settled and we cease to argue about such a trivial matter. Dr. E. C. Nelson.

* In his introduction David McClintock points out that paragraph 27 was written by John Gilmour, who was then Director of the Cambridge Botanic Garden. Ed.

The Gall Midge *Wachtliella ericina*

Mrs. D. Maginess, Broadstone, Dorset

In the 1966 Year Book there is an article by K. M. Harris, then Entomologist at Wisley, on the gall midge, *Wachtliella ericina*, a photograph of which is in the centre of the book. This midge lays its eggs in June on the tip of, usually, *Erica carnea* branchlets, one per tip. A white papery cocoon covers the egg and finally the terminal leaves close tightly around the cocoon forming a tiny knob, which in fact is the gall. The larva, which is bright orange, pupates the following May, when the cycle starts again.

Members of the Heather Society were asked to send any information about this midge gall to the Entomologist. As I had observed this "growth" on my carneas I wrote to Wisley. In reply to questions from Mr. Harris, I was able to report that the gall had been noted for some years, though nothing spectacular, on *E. carnea* 'Aurea', 'Cecilia M. Beale', 'King George', 'Rubra', 'Ruby Glow', 'Springwood White' and 'Vivellii'. 'Springwood White' was the most infested, the flowers in full bloom with galls at the ends of the stems. These observations coincided with those made at Wisley on carneas there, with the exception of 'Cecilia M. Beale'.

Another point made was that plants of *E.c.* 'Springwood White', 'Springwood Pink' and 'Cecilia M. Beale' - apparently with no galls - had been moved from an open position to a more shaded one, when galls seemed to appear. Evidently Wisley had had the same experience. However, there was no proof that the midge favoured shade rather than sun.

A patch of 'Ruby Glow' some six feet by two feet was badly infested; this was cut hard back, and the material burnt. The plants improved; there was no reappearance of the galls in subsequent years.

Galls appeared on two plants of *Erica vagans* 'Mrs. D. F. Maxwell' growing in semi-shade, so were sent to

Wisley for inspection. It was pretty certain however that these were not caused by the same insect.

The natural habitat of *Erica carnea* is on the European Alps, so that they are well used to snow and cold conditions. The droughts of 1975 and 1976 took a heavy toll here; since then I have not seen any midge galls. Maybe when the midge emerged in June there were no new growths on which to lay its eggs, or, if the eggs were laid, the host plant died and was duly burnt before any eggs had a chance to hatch.

A local nurseryman told me that galls had been present in his nursery in about 1956, but by picking off all the affected stems, the trouble soon disappeared. Reports from other Dorset nurserymen reveal that one had been troubled by the midge on his 'Springwood White' in the 1960s, and another said that at that time galls were prevalent throughout the country.

To combat the pest, insecticide sprays used in the late summer or early autumn, may prove useful. I found that severe cutting back of affected plants was the simplest and best way to deal with the problem, and of course to burn the waste material.

[David McClintock tells me that, for the first time, he has had his *E. carnea* attacked by gall midges. Two plants of 'Spring Cottage Crimson' had practically every shoot galled, just three shoots of 'Heathwood' near by, and no other plant attacked at all, of any species. One wonders if the soft growth which was prevalent in some parts of the country in May of last year, has favoured this pest.

David has, or has seen, galled specimens of *E. arborea*, *E. australis*, *E. cinera*, *E. manipuliflora* and *E. scoparia*. He would welcome further examples. The list of species which are known to be attacked by gall midges is further extended by reliable references in the literature to galls on *E. ciliaris*, *E. erigena*, *E. multiflora* and *E. umbellata*.

Ed.]

The Heather Beetle

Dr. M. G. Morris, Institute of Terrestrial Ecology, Director of the Furzebrook Research Station, Wareham, Dorset.

The gardener, more than most people, is very much aware of the depredations of insects. Crops are continually under attack and at times it seems that only continuous warfare against insect pests will ensure any success. However, in the countryside it is only seldom that the attacks of insects on plants are evident. Our landscape remains green in spring and summer, despite the presence of innumerable plant-eating insects with only the occasional species causing visible and extensive defoliation. Among these, most people will have seen from time to time Winter Moth caterpillars stripping the leaves from oaks and other trees, the caterpillars of Small Ermine Moths replacing the foliage of Spindle or Bird Cherry with unsightly silk webbing, and perhaps the occasional outbreaks of Antler Moth caterpillars and the depredations of the yellow and black "Football Shirt" caterpillars of the Cinnabar Moth on Ragwort.

To heather enthusiasts and those who know the moors and heaths of Britain, there is another insect species which produces widespread and obvious evidence of its defoliating abilities from time to time - the notorious Heather Beetle.

The Heather Beetle is known to science as *Lochmaea suturalis* ,the common form of the beetle having a dark line (suture) running down the back. It belongs to the family (Chrysomelidae) whose members feed almost entirely on plants. The adult beetle is about 5 mm long, rather dark and not very striking in colour. Its shape is usually described as "oblong", meaning that it is not obviously tapered either behind or in front. It is clearly a beetle, with the hind wings modified to form wing covers (or elytra) which protect the true functional wings. These wing covers vary in colour from a rather dirtyish yellow to completely black. There are three

divisions to the body, as in all insects. The head is broader than long and bears two long flexible feelers or antennae, which under the microscope can be seen to consist of eleven elongated joints: the two compound eyes are conspicuous. Behind the head, which is dark brown or black, the thorax is also broader than long and brown or black. Under the microscope it can be seen to be pitted and, in parts, depressed. The wing covers obscure the soft abdomen and are the most conspicuous feature of the adult beetle. The six legs of the beetle have "feet" (tarsi) consisting of a rather broad segment followed by a narrower one with a bilobed final joint which bears a pair of small claws.

Like many species, Heather Beetles overwinter in the adult state. They can usually be found by turning back heather at the sides of paths on heaths and moorland, and on mild winter days they may be found moving about, as there is no true hibernation. Activity becomes more general with the onset of warm weather in spring. Heather Beetles walk rather than run and, as in all cold blooded animals, activity depends on temperature. The beetles fly readily in hot weather, probably more frequently in autumn than in spring. Egg laying starts sporadically, but begins in earnest at the end of May or the beginning of June in Scotland; in southern England egg laying probably starts up to a month earlier than this.

When laid the egg is pale yellow and less than a millimetre in diameter; although usually round, or sometimes slightly oval, eggs are often misshapen. They are seldom laid directly on to living heather plants but are usually placed in mosses or plant litter; they seem to require a moist environment for development. This takes at least three weeks, depending on temperature, and the egg gradually darkens during this time as the little grub matures within the shell.

As in all insects, growth of the Heather Beetle larva appears to be irregular because the skin is shed at intervals. After hatching from the egg the young grub starts to feed on Ling (*Calluna vulgaris* and its

cultivars); it does not appear that other Ericaceae are to any extent used as food plants. The first stage larva is black or dark brown, with a black shining head, three pairs of legs in front and an anal sucker on the last segment. The second and third stage larvae do not differ markedly in structure but are, of course, larger, and also paler in colour. The grubs are conspicuous as they feed in exposed positions on heathers and are probably distasteful to birds and reptiles which would otherwise feed on them. They are found mainly from the beginning of June until the end of August.

When fully fed the last stage larvae descend to the plant litter, moss or superficial layer of soil to pupate. Unlike the chrysalis of a moth or butterfly, the pupa of a beetle clearly shows the shape of the perfect insect. The pupa of the Heather Beetle, which may be found in a rudimentary pupal cell, is soft and vulnerable when first found but gradually hardens, though the adult beetle is still soft and callow when it emerges from the pupa. It feeds voraciously on heather, as it did when a grub. In order to overwinter it must build up its body reserves by laying down an effective "fat body". If it overwinters successfully it may, in due course, mate and reproduce.

Outbreaks of Heather Beetle have been recorded since 1853, before the species was formally described to science. The characteristic "scorching", or in extreme cases, complete defoliation over large areas, has been reported at intervals in both Britain and North-West Europe generally, particularly Germany and the Netherlands. In Britain bad attacks have been noted, particularly in the north, e.g. in Scotland, but the 1979 outbreak was very noticeable in Hampshire and Dorset. Perhaps attention has been focused on upland areas of the north because of the importance of heather on grouse moors. The effect of Heather Beetles on the grouse "industry" is probably its most serious claim to pest status, but the interests of bee-keepers have also been affected through loss of the important nectar of heather flowers.

The Heather Beetle would be merely one of nearly 4000 British species of beetles of interest only to specialists if it were not for its food plant and its wild fluctuations in abundance, which lead to visible and obvious damage to heaths and moors in some years. We know very little about the reasons for the occasional outbreak years and are not likely to have an answer unless good intensive research is done on the problem. The life history of the Heather Beetle has been studied in some detail but assessment of the *numbers* of each stage and identification of the agencies which normally reduce or *control* numbers are needed before we can be reasonably certain of the causes of fluctuations in population size. However, some speculation is possible. The fact that some outbreaks, at least, have occurred simultaneously throughout North-West Europe (as in 1979, for instance) points to some interaction between favourable weather for the beetle and its reproductive potential. Most insects, because they lay so many eggs, can theoretically increase in numbers at a remarkable rate, but few do so for any length of time. Those that do, such as locusts, or to a lesser extent, Heather Beetle, are notorious pests. Other factors in the outbreaks of Heather Beetle are likely to be its dependence on one, abundant, food plant, its relative freedom from natural enemies, dispersal by flight, and its known, or suspected, dependence on moist conditions in at least the egg stage.

Dependence on one such dominant plant as heather means, on the one hand, that normally there is a superabundance of food and, on the other, that when numbers of beetles are very high, defoliation occurs because there are no alternative hosts. The natural enemies of the Heather Beetle are few. As has been mentioned, the larvae (and perhaps the adults) are unlikely to be taken in large numbers by vertebrate predators. A parasitic fly is known to attack the adult beetles, but this parasite appears to be local and uncommon compared with its host. It is also a general parasite of several related beetle species and not specific

to the Heather Beetle. A parasitic wasp attacks the grubs and is often locally abundant. There is one common predator of Heather Beetle larvae - the ladybird *Coccinella hieroglyptica*. This is not one of the two common ladybirds of gardens, but a species more or less specific to heaths and moors. Both adults and the active larvae prey on Heather Beetle grubs, but both the ladybird and its prey have only one generation a year, and for this reason the ladybird cannot increase its numbers fast enough to deal with an outbreak of Heather Beetle. On the whole it appears unlikely that "natural" (sometimes called "biological") control of Heather Beetle, even if the agents of control can be manipulated, has much prospect of success.

Dispersal of insect pests is an important factor in their spread to new localities. This may be of relatively little importance in the case of the Heather Beetle, which occurs on areas of moorland or heath which are either maintained continuously as such, or actually being reduced. In annual crops, immigration of pests, and their dispersal from centres of infestation, is an important feature of attack. 1978 and 1979 were characterised by migration of adults in spring, but the importance of dispersal of the Heather Beetle, compared to on-site increase, is not known.

The interaction of the management of heathlands and heather moors with outbreaks of Heather Beetle has been partially examined, but the evidence is not entirely clear. In Scotland the older heather appears to be more often attacked than the young heather regrowing after "muirburn". In Dorset in 1979, however, young heather appeared to have suffered more than older stands from Heather Beetle damage. Burning is generally considered to be ineffective against the beetle because it has to be done in spring, when the adults can escape by flight. Accidental fires in summer may well reduce populations of the less active larvae, but management of heathland by summer burning is not permitted. Work during the 1930s in Scotland pointed to drainage of moorland as being the

most effective method to control numbers of Heather Beetle. But for obvious reasons this is not an appropriate method on the dry heaths of southern England.

The heather nurserymen, or enthusiast with an area of heather garden near a source of infestation, may well find that chemical control is the only answer to the occasional ravages of Heather Beetle. Like so many other problems, the answer as to *why* there are irregular periodic outbreaks of the beetle must await further ecological research.

Heathers and Their Mycorrhizas

Dr. D. J. Read, Department of Botany, University of Sheffield.

Introduction

While great variability in floral structure and pigmentation is a feature of the major ericaceous genera *Erica*, *Calluna* and *Rhododendron*, an equally outstanding, though visually less dramatic attribute of these plants is the characteristic structural uniformity of their root systems. The fine terminal "hair roots" consist of a narrow central core of conducting elements surrounded by only one or two rows of inflated cortical cells. These cortical cells are of great biological interest since, in the region just behind the growing root apex, they are normally completely filled by the mycelium of a fungus which invades them from the soil (Plate Ia, b, c). So extensive is the invasion that there may be 40,000 fungal entry points per centimetre of root length in this region and upto 80% of the root volume is occupied by the fungus (1). These structures, perhaps more than any others in the plant kingdom, are thus most aptly described as fungus roots or mycorrhizas. While most of our native tree species have a mycorrhizal association involving a largely external or sheathing proliferation of fungal mycelium, and many non-ericaceous shrubs and most herbs have an internal or endo-mycorrhizal infection, the pattern of development of the fungus in

tissues of ericaceous plants is quite distinct. The relationship between this so-called "ericoid" type of infection and that seen in other major plant groups is summarised in Table 1.

The ecological situations in which ericoid mycorrhizal roots predominate are, like the roots themselves, remarkably uniform. With few exceptions the plants are restricted to soils of low pH, low levels of available nutrients and high organic content. This parallelism of structure and habitat suggests that the mycorrhizal association has evolved as an adaptation to impoverished soil environments and that the success of ericaceous plants in nutrient stressed circumstances may be at least in part attributable to their mycorrhizal relations. Recent research has begun to elucidate some of the functional relationships between the host plant, the associated fungus and the soil environment of ericaceous mycorrhizas.

Historical Aspects

Much controversy surrounded the early studies of the occurrence and significance of mycorrhiza in the Ericaceae; Ternetz (2) believed that seedlings of *Calluna* could not be grown in the absence of fungal infection, and in a series of reports Rayner (3, 4, 5) stated that while surface sterilised seed of *Calluna* and *Vaccinium* might germinate normally, later development of the shoot and root was inhibited in the absence of the fungus. She believed that infection of the root extended into the shoot system and that it eventually reached the seed coat so that, at germination, the emerging radicle was immediately infected by the requisite fungus. This pattern of fungal distribution has been called systemic infection.

Many workers both at the time of Rayner, and more recently have produced results which strongly contradict the thesis that systemic infection is either normal or necessary for seedling development. It has been repeatedly shown that normal development of

ericaceous seedlings can be achieved in completely sterile conditions (6, 7, 8), and there appears to be not a single authenticated report of the isolation of the mycorrhizal fungus from any part of an ericaceous plant other than the mycorrhizal root itself.

Despite Rayner's assertion that systemic infection was a normal feature of ericaceous plants she provided no confirmatory evidence in the form of back-inoculation to synthesise mycorrhizas. Doak (9) was the first to combine the isolation of an endophyte from the roots with back-inoculation to synthesise mycorrhizas. Later, Friesleben (10, 11) showed that fungi isolated from *Vaccinium* would form mycorrhizas not only with their original hosts, but with a wide range of other ericaceous plants including *Calluna* and *Erica*. The endophyte thus appeared to show little host-specificity. This feature has since been confirmed by Pearson and Read (12), who showed that the mycorrhizal fungus isolated from any species with ericoid mycorrhizas will readily form mycorrhizas with other ericoid hosts.

Identity of the Mycorrhizal Fungus

Both Ternetz and Rayner believed that the mycorrhizal fungus of ericoid plants was a member of the genus *Phoma*. Ternetz (*loc. cit.*) isolated this fungus from the roots of several ericaceous plants and called it *Phoma radicis*. Rayner (3) found only common soil fungi in the roots of *Calluna* and proceeded to obtain most of her isolates from the shoots and seeds which she believed also to contain the mycorrhizal fungus. From these she obtained a pycnidium-bearing fungus which was again referred to the genus *Phoma* and called *P. radicis*. None of the *Phoma* isolates were ever shown to produce typical ericoid mycorrhizas. This fact, coupled with the knowledge that *Phoma* is a common colonist of moribund tissue in a wide range of plant species, strongly indicates that it is not the mycorrhizal fungus of ericoid mycorrhizas.

The only procedure which will demonstrate unequivocally that a fungus is truly mycorrhizal is to isolate it as it emerges from the infected cell, and then to inoculate the isolate into aseptically grown seedlings to ensure that it produces a normal mycorrhizal association. Stages in the use of these isolation and re-inoculation procedures are shown in Plate II a to d. Most workers who have systematically isolated endophytes from roots and then re-infected seedlings have reported that the fungus is sterile and described their isolates in terms of different culture characteristics. Thus, for example, Friesleben identified strain differences while Bain (13) and Burgeff (14) described colour and growth form differences which distinguished their isolates. Despite these differences a number of features of all these isolates are held in common, and it may be more advantageous to stress the similarities rather than the small differences between isolates. The most important common feature of course is the capacity to form mycorrhizas. Further than this, however, even in cultures common features are found. Thus the isolates are normally slow-growing on nutrient agar, and have a colour in the range grey, grey-brown to vinaceous fawn. The growing edge of the culture is characteristically white when viewed from the under side of the petri dish. An important negative feature is that pycnidia are not formed by any such isolates. It has now been shown (15) that typical ericoid endophytes of the type described above can be stimulated to form fruit bodies under some circumstances. They are small orange structures, which are up to 1 mm in diameter and are initially cup shaped but become flattened discs at maturity. Analysis of the structure of these fruit bodies shows the fungus to be an ascomycete and it has been named *Pezizella ericae* Read. Ultrastructural studies of mycorrhizal roots of *Calluna* and *Vaccinium* have confirmed that the endophyte is ascomycete (16, 17).

Effects of Mycorrhizal infection on growth

The protracted arguments over the nature and development of ericoid mycorrhizal infection served to distract attention from the more important question of the role of mycorrhizal infection in the growth and nutrition of the host plant. Several early studies revealed that seedling development was inhibited on peat which had been sterilised by autoclaving. The experiments of Frieslaben (*loc. cit.*) led him to the conclusion that the major effects of the mycorrhizal fungus was to detoxify the peat. However, this attribute was not exclusively shown by mycorrhizal fungus, since a range of saprophytic fungi had the capacity to alleviate the toxicity. Similar results were obtained by Bain (*loc. cit.*) and Burgeff (*loc. cit.*). Thus, until recently, mycorrhizal infection has been considered to be of little significance to the plant except perhaps in the establishment phase. It has been suggested that during the major part of the plant's life the fungus is present as a weakly parasitic associate. It is clear that the relatively massive fungal presence in the ericoid mycorrhizal root must constitute a significant drain on the plant's reserves of sugars. It seems unlikely, however, that the host could sustain this drain and its great competitive vigour in the nutrient stressed heathland habitat if the flow of nutrients was purely unidirectional. The hypothesis that the characteristic association between host and endophyte is a mutualistic one involving two-way flow of nutrients, and that the partners have co-evolved in a manner which permits satisfactory exploitation of a marginal habitat, seems more reasonable. Our experiments were therefore designed to test this hypothesis.

Experiment in Soil

In order to evaluate the role of mycorrhizal infection in plants it is necessary to compare their growth and

mineral nutrition in the mycorrhizal (M) and in the non-mycorrhizal (NM) condition. It is important also, that comparisons be made in circumstances resembling as closely as possible those of the natural environment of the test plant. Since all natural heathland soils contain the ericaceous endophyte, some sterilisation treatment is required so that control plants can be grown in the NM condition. In view of the failure of control plants to grow normally on autoclaved soil, a superior sterilisation treatment has been sought. The most suitable soil sterilisation procedure found to date is γ irradiation. Soils sterilised by this method are non-toxic and complete removal of the endophyte can be obtained with relatively small doses of radiation (0.8 M rads). Systematic analysis of the response of *Vaccinium* and *Calluna* plants to inoculation with the mycorrhizal endophyte in small volumes of irradiated soil have demonstrated that mycorrhizal plants produce greater yields and have significantly higher nitrogen and phosphorus contents than non-mycorrhizal controls (18).

Having obtained these results we were particularly interested to learn whether the enhanced nitrogen contents of the mycorrhizal plants arose simply as a result of an improved capacity to capture simple N containing minerals like ammonia from the soil or whether the fungus could absorb, assimilate and transfer nitrogen sources which were too complex to be utilised by plants lacking the endophyte. Experiments using heathland soil which had been labelled with the stable isotope ^{15}N suggested strongly that mycorrhizal infection was providing access to organic sources of nitrogen which are unavailable to non-mycorrhizal plants (19). Since organically complexed nitrogen sources represent by far the greatest reserve of N in heathland soils, this observation was of great interest. Further elucidation of the nature of the nitrogen compounds utilised by mycorrhizal plants grown in peat or mor-humus is difficult because of the chemical complexity of the media. For this reason our most recent

experiments have concentrated on an analysis of growth and nutrition of M and NM ericaceous plants in sand to which individual organic or mineral constituents can be added.

Experiments in Sand

In the experiments we have normally used *Vaccinium macrocarpon* (Cranberry) as our test plants, because of its relatively rapid growth rate. However, in smaller parallel experiments it has been repeatedly shown that *Calluna* responds in a comparable manner to mycorrhizal infection.

We first compared the growth of M and NM ericaceous plants in sand containing standard nutrient solutions in which N was supplied as ammonia in logarithmically increasing quantities (20). Under these circumstances M plants showed superior growth and nitrogen uptake at intermediate levels of N supply. Thus while no growth stimulus is found in M plants at 1, 20 or 50 mgN/1, significant growth enhancement is found at 2.7 and 7.5 mg/1. The failure to find a growth response at 1 mg/1 is interesting. It probably indicates that the benefits derived from infection at such low levels of N do not counter-balance the drain on plant assimilates by the infecting fungus. At the highest levels of ammonia application the supply of N to the roots of NM plants was obviously sufficient to sustain optimal growth. It is important to realise, however, that such luxury levels of N are rarely experienced by plants growing in the field, where levels of free ammonia are more normally in the range in which a mycorrhizal enhancement of growth was observed. Experiments were also designed to compare the capacity of M and NM plants to utilise NH_4 and a range of simple organic N sources in the form of amino acids (21). These were supplied at equivalent concentrations in acid washed sand, which was maintained in the sterile condition. The results (Table 2) indicate that whereas M plants can use most of the

organic N sources as readily as the mineral source, the NM plants have a very limited capacity to use these substances. A further interesting point is that the capacity to assimilate organic N is specifically a feature of mycorrhizal infection since plants grown in sand inoculated with some commonly occurring soil saprophytic (SAP), like those in the NM category, showed no comparable utilisation. The probable ecological significance of these results is discussed later.

Some observations on the function of Ericoid Mycorrhiza in the Heaths of Southern Africa

Despite the fact that the genus *Erica* reaches its greatest level of species diversity in Southern Africa, the conservatism of form shown by the ericoid root system is retained. Examination of root systems of Cape *Erica* species during the wet winter months reveal that the mycorrhizal associations are structurally identical to those of European representatives of the genus and that the isolated mycorrhizal fungus has similar cultural characteristics. The climate of the Cape region is characterised by a marked seasonality, mild wet winters being followed by hot dry summers. One of the puzzling aspects of the biology of many Cape Heath species is that maximum growth, as well as flowering and seed set, coincides with the dry period of the year. Observations of ericoid root systems during this period show that, in contrast to the winter conditions, they have a moribund appearance, the cortical cells being either collapsed or, at best, devoid of contents. It seems possible, therefore, that materials are transferred from root to shoot during the dry periods in order to sustain growth. There is some experimental evidence to support such a hypothesis. As part of an experiment on nutrition of Cape Heaths, plants of *Erica bauera* were grown from seed in the mycorrhizal and non-mycorrhizal conditions in a soil with supra-

optimal nitrogen concentrations (22). The plants were then transferred to sand in which they were grown for a further four weeks during which time they were supplied with a mineral nutrient solution from which nitrogen was excluded. Shoots of both M and NM plants were harvested at weekly intervals through the four weeks and their N contents were determined.

During this period the nitrogen contents of the NM plants declined progressively while that of the M plants was sustained (Fig. 1). Microscopic analysis of the root systems of harvested M plants revealed that during the four weeks of growth in the absence of nitrogen the level of infection decreased markedly, presumably as a result of breakdown of the fungal material. We believe that nitrogen contents of the shoots of M plants was sustained by transfer of nitrogen stored in the fungal coils of the root cortical cells. The results thus indicate that in addition to provision of enhanced uptake and increased access to recalcitrant forms of N, the mycorrhizal fungus may act as a store of seasonally released nutrients which can later be used to sustain growth during unfavourable climatic conditions.

Experiments on Resistance to Heavy Metal Toxicity

Apart from the positive attributes of mycorrhizal infection, it is possible that the presence of fungal complexes in the absorptive portions of the root systems of ericaceous plants might provide a mechanism for the selective exclusion of potentially toxic substances.

Sand culture experiments have revealed that plants with ericoid mycorrhiza have greatly increased tolerance of heavy metals (23). M and NM plants were grown in dilute mineral nutrient solution to which was added either zinc as zinc sulphate at concentrations of 25, 50, 100 or 150 mg/1 or copper as copper sulphate at concentrations of 10, 25, 50 or 75 mg/1. Both of these elements have a markedly inhibitory effect on plant

growth in the NM condition, root growth being particularly affected. Growth of M plants is relatively unaffected and only at the highest metal concentrations is major growth reduction seen. Though the metal concentrations employed in these experiments were higher than those which would normally be encountered in field situations, it is a fact that metal ions like zinc and aluminium become particularly mobile under acid conditions and hence the tolerance of heavy metals provided by mycorrhizal infection could be an important factor in the successful exploitation of acid soils by ericaceous plants.

Discussion

The results so far obtained suggest that mycorrhizal infection of ericaceous plants facilitates enhanced nutrient uptake under circumstances in which nutrient availability is low . The enhanced uptake arises as a result of two separate factors. The first of these is the improved exploitation of soil provided by the fungal hyphae ramifying from mycorrhizal roots. The second involves the exploitation of nutrients, in particular organic sources, which would otherwise be unavailable to the plant. In addition, the mycorrhizal infection probably fulfils a storage function which enables the shoot to receive a constant supply of nutrient elements and thus to be to some extent buffered from seasonally induced fluctuations of mineral nutrient availability found in soils.

The presence of ericaceous species as dominant components of nutrient poor heaths of both northern and southern hemispheres and the remarkable constancy of their root structures and of their fungal associates suggests that a common factor, probably that of restricted nutrient supply has been a major selective pressure leading to the development of their specialised absorptive systems. Other plants in the same habitat in

both hemispheres have adapted to the same pressures by different methods. One of the most interesting examples is the insectivorous genus *Drosera*, which is widely found occupying an understorey position below ericaceous canopies in both hemispheres. Insectivory has long been recognised as a special adaptation to enhance nitrogen supply. It is interesting to consider that in place of the insect, the ericaceous plant in the same habitat has selected a fungus as its supplementary source of nitrogen. Such a relationship may be more costly to the plant in terms of carbon supply to the symbion, but the investment is repaid handsomely by a partner which, unlike the insect, is constantly present in time of need.

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Table 1. Details of the four main categories of mycorrhiza showing the distinctive structural and functional attributes of the ericoid type.

	Type of Mycorrhiza	Major fungal partners	Host Range	Characteristic Features
I	Sheathing or Ectomycorrhiza	Basidiomycetes (many of the common toadstools *e.g. Amanita, Boletus*).	Most boreal and temperate zone forest tree species e.g. Pine, Oak, Birch. Some tropical and sub tropical trees e.g. Dipterocarps and Eucalypts.	Sheath of fungal mycelium around roots with extension of hyphae or strands of hyphae outwards into soil and inwards between, but not into, the outer cortical cells. Primarily involved with phosphate transport and storage. Other nutrients and water are also transported.
II	Endomycorrhiza. a) Ericoid	Ascomycete. Cup fungus, *Pezizella.*	Most members of Ericaceae e.g. *Calluna*, *Erica*, *Vaccinium*, *Rhododendron.*	Fungus growing primarily within but not between the cortical cells of fine 'hair roots'. No sheath or strands but some surface mycelium with individual hyphae penetrating the soil. Primarily involved with absorption of nitrogen compounds.

	b) Vesicular-Arbuscular VA	Phycomycete members of genus *Endogone*, *Glomus*.	Most herbaceous plant species in all types of vegetation. Also in some trees especially in the tropics.	Inter - and intra - cellular penetration throughout the root. Formation of vesicles (in which reserves are stored) and branched 'arbuscules' (through which nutrients pass) by the fungus. Fungus growing extensively along the root between the cortical cells. Primarily involved with phosphorus transport.
III	Arbutoid	Basidiomycetes, including many of the fungi which form sheathing mycorrhizas.	Ericaceous genera *Arbutus, Arcto-staphylos*, *Pyrola*.	Sheath formation and penetration of cortical cells both occurring. Role probably similar to that of sheathing mycorrhizas.
IV	Orchidaceous	Basidiomycetes. Mostly members of the genus *Rhizoctonia* which do not form conspicuous fruit bodies in nature.	Most *Orchid* species.	Hyphal coils in cortical cells of thick fleshy roots. Nutritional role poorly understood.

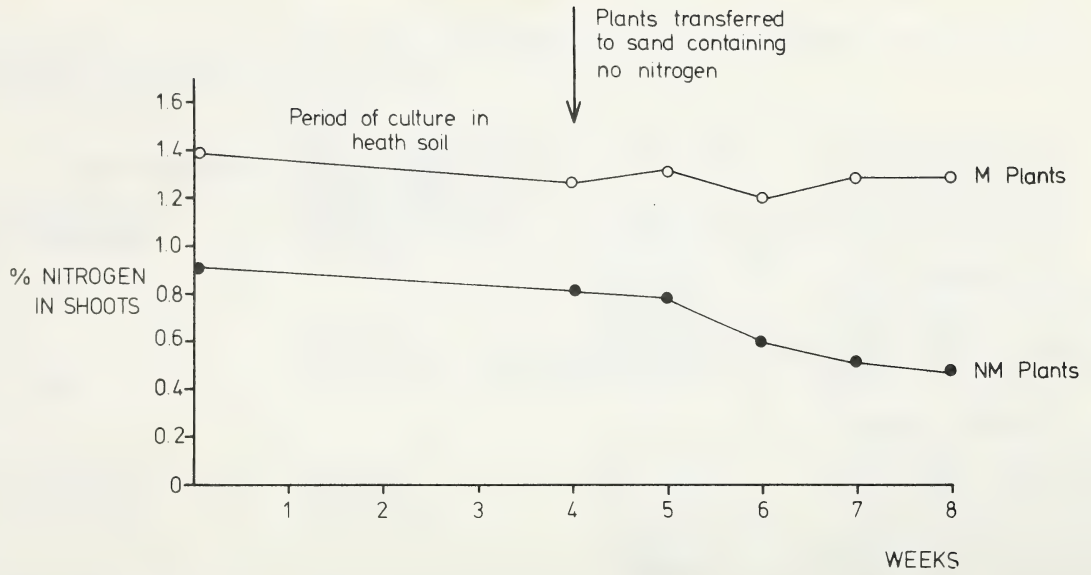


Fig. 1. Showing the effect of nitrogen starvation on shoot nitrogen content in mycorrhizal (M) and non-mycorrhizal (NM) plants of Erica bauera.

Table 2. The effect of different nitrogen sources on shoot dry weight (mg per pot) of *Vaccinium macrocarpon* in mycorrhizal (M), non-mycorrhizal sterile (NM) and non-mycorrhizal non-sterile (SAP) condition. Asterisks (*) denote significant differences in dry weight between M and both other treatments at p 0.05.

Nitrogen Source (20.5 mg/1)	Treatment M	NM	SAP
Ammonium	43.4	41.4	-
Glycine	43.9*	11.6	11.4
Alanine	47.6*	22.5	9.4
Aspartic Acid	29.5*	7.0	8.1
Glutamic Acid	39.4*	8.2	9.7
Glutamine	44.6*	18.2	23.3
No Nitrogen	6.0*	8.3	8.7

Erica arborea 'Alpina'

Maj.-Gen. P. G. Turpin,
West Clandon, Surrey.

If you ask a nurseryman or any experienced gardener what is the exact difference between *Erica arborea* and *E. arborea* 'Alpina', it is more than likely that you will get an evasive answer. And if you hunt through the many books on shrubs in a botanical library, you will look in vain for a satisfactory description of this distinct form of *E. arborea*. And yet, when it was first introduced at the beginning of this century, it was considered by Bean to be sufficiently different from the type to warrant classification as a distinct species.

E. arborea has been grown in this country for a long time. According to the records it was being grown in Oxford in 1658. No doubt during the last 320 years the plant, which grows naturally over a vast area, has been collected from many different places. It would be

surprising if there were not some variation between plants, which have had such different origins and from which many seedlings must have arisen. There can be no doubt that some of these have been sold as *E. arborea* 'Alpina'.

E. arborea 'Alpina' was discovered by Georg Dieck, the German plant collector and nurseryman of Zöschen, in 1892, at a height of 1400m (4550 ft) at the upper tree level, in a wild and inaccessible area of central Spain, near the sources of the Tagus and the Jucar, in the mountains of Cuenca. A plant was sent to Kew in 1899 and at about the same time it appeared in Dieck's nursery catalogue, as one of the most promising plants which he had introduced.

It is a reasonable assumption that all our plants of this variety are descended from the same clone. Except where a sport has occurred (such as the beautiful golden form 'Albert's Gold'), there should be no variation between authentic specimens and the original plant which Dieck collected.

The most commonly quoted characteristic of *E. arborea* 'Alpina' is its hardiness. In Western Germany and Holland, where weather conditions are more severe than they are in the British Isles, it is the only form of Tree Heath which is considered to be really hardy, although even this plant is sometimes cut to the ground by prolonged spells of hard frost. All the plants of *E. arborea* growing in the open in North-West Europe are, therefore, likely to be 'Alpina'. In 1978 there were plants growing in a sheltered position at Driebergen, in Holland, which were at least 10 ft high.

Early descriptions of *E. arborea* 'Alpina' are to be found in Dieck's *Catalogue,1902/3*, in the *Kew Bulletin*, 1910 (Bean) and in *Garden*, 1911 (A. Osborn) with an illustration of the Heath in flower. Dieck described "the fine bright green foliage, the slim poplar-like growth and the beautiful white flowers".

Bean's description reads:-

"Compared with the ordinary *E. arborea*, it is a sturdier

bush with stiffer, more erect branches, and altogether more compact. The young shoots are covered (like the type) with an abundance of branched hairs which, under the lens, give them quite a mossy appearance. The flowers are tiny but very numerous, of a rather dull white, and produced in spring in stiff, pyramidal panicles 1 foot or more long. The great charm of this variety, however, is the cheerful vivid green of the plume-like branches all through the winter. No frost since 1899 has affected it in the least."

Osborn said that the plant at Kew was 6 ft in height (after 10 - 12 years). Bean, in *Trees and Shrubs Hardy in the British Isles* (1914), described it as 8 to 10 feet high and 24 ft across.

There was a tale that the plant received in 1899 was still at Kew in 1945, but there is no information about this in the Kew records, apart from a reference to the original acquisition of the plant.

If we follow the clues given by Dieck, Bean and Osborn, and if we take into account the description given by Maxwell and Beale in their early catalogues that "it flowers rather late", we may find it not too difficult to isolate plants of *E. arborea* 'Alpina' from other forms of *E. arborea*.

We should look for the following characteristics:-

(a) The plant should be more like a shrub than a tree in growth, and it should be more compact and sturdy than the type of *E. arborea*.

(b) Normally it should grow to a height of 8 to 10 ft (3m), and its spread should be as great as its height.

(c) The foliage should be a vivid green all the year round.

(d) The flowers should be tiny, particularly in bud, in stiff pyramidal clusters.

(e) The flowering time should be at least 4 to 5 weeks later than the type.

By examining plants in this country, which are

reputed to be authentic, and by comparing them with plants growing in the open in Germany and Holland, it has been possible to build up a comparative table showing the differences between *E. arborea* and *E. arborea* 'Alpina' (see Appendix).

Authentic plants may be seen at the R.H.S. Gardens, Wisley, the Northern Horticultural Society's Gardens, Harlow Car, the Heather Garden in Windsor Great Park and in the Hillier Arboretum.

E. arborea 'Alpina' was awarded an A.G.M. in 1933 and an A.M. in 1962.

Appendix

Comparative table, showing differences between *E. arborea* and *E. arborea* 'Alpina'.

E. arborea	*E. arborea* 'Alpina'
Tall shrub or tree with a marked trunk to 20 ft (-), erect with spreading branches.	Compact branching shrub to 10 ft (- 15), spreading to 20 ft (- 25).
Foliage dark emerald green.	Foliage bright vivid green
Branches woody with side-stems, (mostly in threes,) growing from leaf axils.	Branches woody with many side-stems, (mostly in threes,) closely packed together and comparatively short.
Young shoots covered thickly with branched hairs.	Young shoots covered with branched hairs.
Leaves 4 to 8.75 mm long, 0.75 mm wide.	Leaves 4 to 6 mm long, 0.5 mm wide.

E. arborea	*E. arborea* 'Alpina'
Pedicel 3 to 5 mm, red, pink, greenish white or white; bracteoles at base or 1 mm from base.	Pedicel 3.5 mm, white to sage green (no pink colour); bracteoles at base.
Calyx saccate, white; sepals ovate, 1 to 1.5 mm.	Calyx saccate, white; sepals ovate, 1 mm.
Corolla globular with recurving lobes, 3.5 mm long, 2 to 2.5 mm wide. Base of corolla to base of intersection between lobes 2 to 2.5 mm.	Corolla globular 3 mm long, 2 mm wide. Base of corolla to base of intersection between lobes 2 mm.
Racemes up to 15 in (- 18 in) long with slightly spreading panicles.	Racemes up to 12 in long, with closely packed panicles, cigar-shaped (reminiscent of a Buddleia raceme).
Time of flowering. Buds appear during second half of November or early December. In full flower March to end of May.	Time of flowering. Buds begin to form in early or mid-December. In full flower in mid-May.
Flowers very fragrant.	Flowers fragrant.

The Bell Heather in Madeira

David McClintock, Platt, Kent.

History

Very little seems to have been written about this plant, endemic to Madeira. Its first recognition was by George Bentham in 1839 in de Candolle's *Prodromus*, vol vii (2) p 666, when he formally named it var *maderensis* of *Erica cinerea*. He distinguished it as having *"foliis non fasciculatis, corollis angustioribus"* and cited a specimen he had seen from S. M. Lemann (1806-52), who was in Madeira in 1837-8.

The Rev. R. T. Lowe (1802-74) spent 26 years in the island mostly as English Chaplain. In his *Manual Flora of Madeira* of 1868 he wrote that he "could perceive no stable difference whatever to warrant (Bentham's) separation of the Madeiran plants as a variety from the British or European". He described the leaves of the Madeiran plant as "presently fasciculate", but in fact they never are, as the specimens he himself collected demonstrate. At Kew there is an undated specimen from C. B. Clarke (1832-1906) on which is the comment "very unlike English *cinerea*"; and that is the strong impression most people get when they see it growing - as few have.

Lowe's assertion might have been influenced by the unique, enigmatic, single specimen, now in the BM, of what is undoubtedly good *E. cinerea*, leaves fasciculate and all. Its label, in an unrecognised hand, runs "*in montibus aridis, inter St Anna et Pico Ruivo socialis cum Vaccinio maderense*". To this label has been added in Mr. Lowe's handwriting "Burao Paivo. August 10/60". This sheet came from Mr. Lowe's herbarium and reached the museum on 22nd May 1875, after his death by drowning. Nobody before or since has found this plant - the locality indicated covers quite a wide area. One wonders indeed if the label perhaps got stuck on to the wrong sheet.

The next important event in this story was when Bentham's variety was raised to specific status by J. F. N. Bornmüller in 1904. His comments in *Botanische Jahrbücher*, Vol. 33, p 458, after visits lasting 4 or 5 months to the island in 1900 and 1901 run "Sie unterscheidet sich von der ihr nächstverwandten *E. cinerea* L. durch die Gestalt der Corolla (fast cylindrisch) mit weiter Öffnung und grossen halbkreisförmigen Saumlappen, ferner durch bedeutend grössere blutrotgefärbte Kelche. Die Blüten befinden sich scheinbar doldig am Ende der Zweige und haben in ihrer Färbung nicht dem blaulichen Ton, welche für *E. cinerea* L. so charakeristisch ist," - no mention of the most obvious feature, the non-fasciculate leaves.

Few however seemed to be aware of this change of rank, for the plant continued, with few exceptions, to the present day to be called a variety of *E. cinerea*.

In mid July 1974 Don Richards and I went to Madeira to study it. We had the benefit of the company of the late Maj. H. Pickering, and saw it in about half a dozen places between about 3,000 and 6,000 ft. It was in quite small colonies, never abundant, few of which would have been found without his help, Lower down, in sheltered open places it grew bushily to some 2 ft tall and across, while high up it draped exposed rocks for 3 ft or so, the plants evidently of considerable age. We also saw it growing erect closely appressed against a rock face, in a sheltered moist locality. All except the youngest plants had thick stout stems, and a large, robust look which made them distinct in 'jizz' from European Bell Heather. The colour of the flowers we saw was identical with that of the usual form of *E. terminalis* - which is mauve, H2. Lowe described them as rose pink, but later added that they varied from light pink to full deep rose or rose purple, never white. My notes say that one plant at Pedra de Rija had flowers which varied from deep rose pink back to very near white, not apparently caused by shade. But I wonder . . . We brought back a good representative set of specimens, some of which were

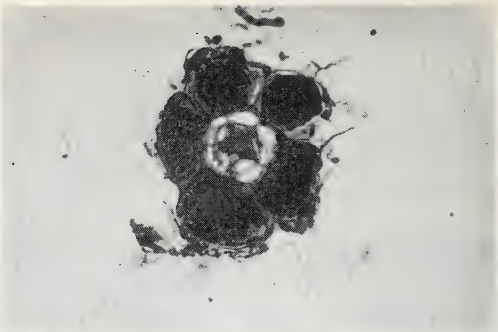
presented to the BM; several are in the Society's herbarium. Other recent visitors have seen and collected it, for example Mr. B. Halliwell of Kew, Dr. J. Lovis of Leeds, Prof. D. M. Moore of Reading and Mr. C. Pettitt of Manchester.

Comparison

In stoutness, unfasciculate leaves and flower colour the Madeiran plant is indeed reminiscent of *E. terminalis,* and Mr. Ross, then Keeper of Botany at the British Museum, wrote "it has, of course, nothing to do with *E. cinerea* . . . (it) is closest to *E. terminalis*". In order to assess this and to see just how these differed, the following table emerged - characters common to all three taxa are omitted: I agree with Bornmüller's distinctions only over the shape of the corolla and its colour. The areas of natural distribution of the three are quite distinct, with no overlap.

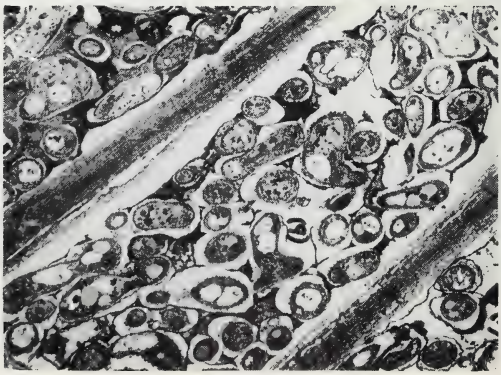
	cinerea	*maderensis*	*terminalis*
Habitat	moorland	montane	sheltered valleys
Height/length	5 - 60 cm	5 - 60 cm	100 - 180 cm
Young shoots	pubescent	pubescent	glabrescent
Old stems	thin short-lived	thick long-lived	thicker long-lived
Habit	prostrate-erect	prostrate-erect	erect
Leaves in	3's, soon fasciculate	3's	4's - 6's
Leaf length, mm	3 - 7	4.5 - 6 (- 10)	4 - 7 (- 10)
Leaf margin	inrolled	inrolled	half rolled
Inflorescence	racemose	paniculate	umbellate
Flowering period in England	June - Sept.	May - Oct.	July - Oct.
Bracteoles	close to calyx	close to calyx	half way
Hyaline calyx	narrow lobe margin	broad	none
Calyx: corolla *c.*	1 : 2	1 : 2 - 3 : 4	1 : 3
Corolla shape	urceolate	narrow ovoid	narrow ovoid
Typical colour	purplish	dull pink	dull pink
Anther appendages	broad, sharply toothed	filiform, entire	narrow, minutely toothed
Pollen grains	tetrads	tetrads	free
Pollen size,	47	40 - 48	22
/$^{\mu}$ microns or 10^{-6}m			
Ovary	glabrous	glabrous	pubescent

Maj. - Gen. P. G. Turpin, C.B., O.B.E.
The Chairman of the Heather Society.



1a

1b



1c

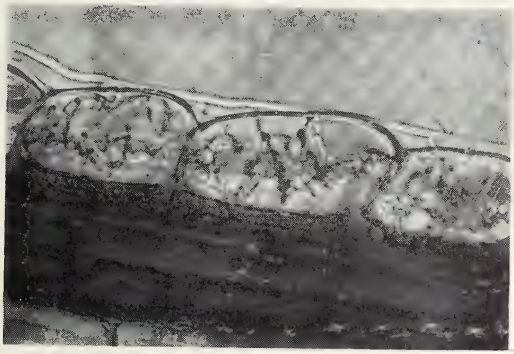
Plate 1a Transverse section of a hair root of *Calluna* showing a single outer row of infected cortical cells each of which is densely packed with fungal mycelium.

Plate 1b. Scanning electron micrograph of the surface of a hair root of *Calluna* showing weft of external hyphae of the mycorrhizal fungus, some of which are penetrating the outer cortical cell walls.

Plate 1c. Transmission electron micrograph of cortical cells of a hair root showing individual hyphal elements filling the cells.

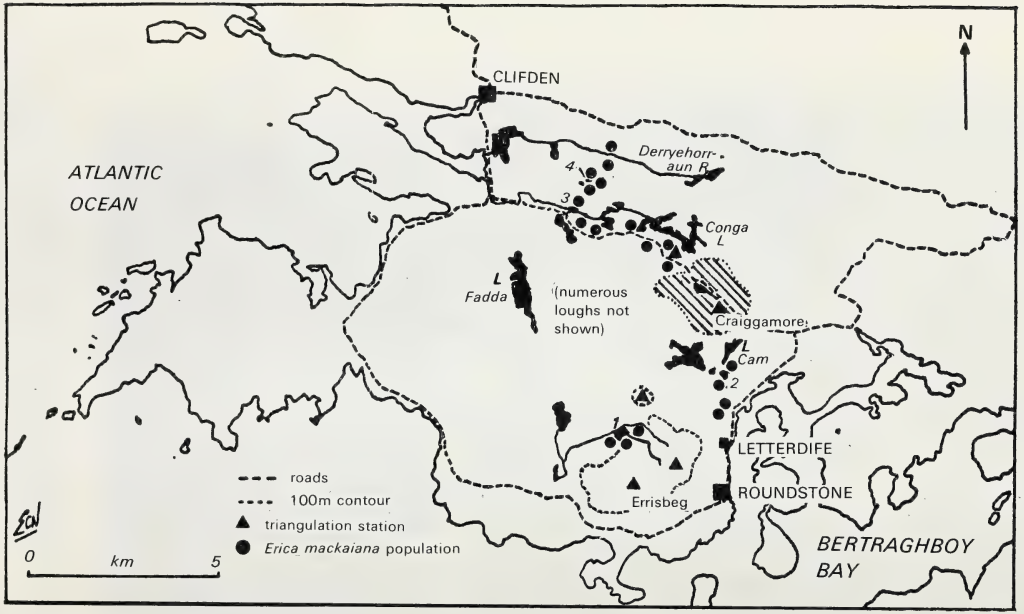
2a-d

2e



Plates 2a-d Stages in the emergence of the mycorrhizal fungus from an infected cortical cell which, as one of a group, has been dissected from a root and placed on nutrient agar.

Plate 2e Lateral view of root of an aseptically grown *Calluna* seedling which has been inoculated with the mycorrhizal fungus. Early stages of fungal infection of the cortical cells can be seen.



Distribution of ***Erica mackaiana*** Bab. near Roundstone, Co. Galway. Main populations near Craiggamore are included within the hatched area (after Webb 1954); populations confirmed in August 1980 are shown by black dots.
(Loughs numbered are - 1. L. Nalawney, 2. L. Doon, 3. L. Nafeakle, 4. Doo Lough).

Discussion

This suggests that *E. maderensis* has much more in common with *E. cinerea* than with *E. terminalis*: the nature of the pollen grains is especially noticeable. But the table also shows that *E. maderensis* differs in enough ways for varietal status to be insufficient to separate it. The category of sub-species was not used in Bentham's day, and it is for consideration whether this is not a correct assessment of the distance the Madeira plant has developed in isolation from *E. cinerea*. My view is that Bornmüller was right and the two have deviated sufficiently for each to be granted specific status. It would help if someone could try to cross the two and see what happened.

Garden Value

This species has been growing in my garden at Platt for some years now. Here it does not really thrive or make the floriferous display to be seen in the climate of Madeira. In D. Richards' garden in Cumbria however, seedlings "keep popping up all over the place." Until they flower, he cannot tell them from those of *E. arborea*, *E. lusitanica* or *E. australis*. He considers it a neat and charming plant for the rock garden in acid conditions. Certainly it does have a character of its own, in addition to its botanical interest.

Acknowledgements

Mr. R. Ross at the British Museum (Natural History) took a keen interest in this plant in the early days of this enquiry. It is due to the skill of Dr. G. Clarke, also of the BM, that we know about its pollen; and I have discussed the plant helpfully with Brian Halliwell and Don Richards, among others.

Riddles of the Irish Heaths - An Irish Tour

Maj. E. W. M. Magor, St. Tudy, Cornwall.

Visiting Connemara before the war with my father-in-law and my (then) fiancée, I remember him pointing across the bog south of Clifden and saying "there are the Clifden Nearings, where I used to shoot snipe as a boy; I believe some interesting heathers grow there." Later, my wife gave me a copy of Dr. R. Lloyd Praeger's *The Botanist in Ireland*, and I discovered what those heathers were, but the opportunity never arose till now to go and see them for myself.

At the time of the Heather Society Conference in 1979, after a day among the *Erica ciliaris* on Hartland Moor, I asked if anyone could tell me more about where I could see *E. mackaiana*, and was referred to the Rev. P. P. Flavin's article on Craiggamore in the *Heather Society Year Book* for 1967 (1). Having by this time seen in the wild all the heaths native to England, I was anxious to see the Irish heaths also. Seeing in the 1980 *Year Book*, David McClintock's review of *Irish Gardening and Horticulture*, of which a joint editor was Dr. E. C. Nelson, I wrote to ask him whether he could suggest a local botanist who might be persuaded to show me the Connemara heaths.

To my delighted surprise, Charles Nelson promptly replied that he was himself quite willing to be persuaded, and suggested including *E. mackaiana* in Donegal and *E. vagans* in Fermanagh also for good measure. In my elation, I mentioned this to David McClintock, and was even more delighted when he said that he would come too.

The McClintocks and I crossed with a car from Liverpool to Belfast on the night of August 7th, 1980. Leaving the McClintocks to spend the weekend with relations, I went off plant hunting on my own for a couple of days, armed with directions very kindly provided by Paul Hackney, Assistant Keeper of the Department of

Botany at the Ulster Museum in Belfast. First however I went to the Magilligan Dunes in County Londonderry, east of the mouth of Lough Foyle, to look for *E. terminalis*, long naturalised just west of the level crossing, but I failed to find the right spot. I was consoled however by seeing quantities of Sea Buckthorn, Burnet Rose (fruiting), Harebell, Grass of Parnassus and *Viola curtisii*.

On August 11th, we met Charles Nelson at L. Nacung in the west of Co Donegal, in the shadow of Errigal and in view of The Poisoned Glen. *E. mackaiana* was first collected on the shores of Upper Lough Nacung in 1909, but not recognised as such until much later. Here, I received my first lesson in distinguishing it from *E. tetralix* and the hybrid, *E.* x *stuartii* (formerly x *praegeri* (2)). In this station, *E. mackaiana* is perhaps easier to distinguish than it is in Connemara, as it seems here a taller plant with showy umbel-like inflorescences, and the flowers larger and of a richer colour. Typically, in *E. mackaiana* the sepals and ovary are glabrous, while in *E. tetralix* these parts are downy. In typical *E. mackaiana* the foliage on the flowering shoots stands out thickly, nearly horizontally, right up to the inflorescence, while in *E. tetralix* it is sparser, appressed and absent immediately below the flowers. The hybrid does not stand out as showily as *E. mackaiana*, and is intermediate in these characters. Later, in Connemara as I began to get my eye in, we were to see much variation in *E. mackaiana*, and in *E.* x *stuartii*, as well as forms of *E. tetralix* that were eglandular and even glabrous.

How comes it that this flourishing station was only found 75 years after the plant was first identified in Connemara, and are we really certain that it does not occur elsewhere also, away from a road, perhaps in Mayo or Sligo ? In fact, it had been recorded in 1962/3 from Portacloy in Co. Mayo. (3)

From L. Nacung, we crossed the border again into Co. Fermanagh without let or hindrance and, after being

very hospitably entertained by Charles Nelson's parents, next day visited the colony of *E. vagans* in what is now the Carrickbrawn Area of Scientific Importance by the Black River, north of Upper L. Macnean, near Belcoo (HO 30439, O.S.N.I. 1" sheet 7). It was first found there by Major Dickie of Enniskillen while out shooting some time prior to 1936, (4).

There are about 500 plants over an area some 50 yards by 30 yards; the remarkable thing is that they are all white-flowered. This is the only station in Ireland where this Lusitanian heath has any claim to being native; the only place in Britain where it is undeniably native is the Lizard peninsula in Cornwall, where over a wide area it is almost the dominant heath and, though more often white than with other native species, this is by no means the normal colour. Could this be a pre-glacial survival ? The status of this colony is fully discussed in Nelson and Coker's paper (5); see also (6) and *Irish Gardening and Horticulture*, 1979, p 27.

From Fermanagh, we then drove down through Roscommon into Galway, and on to Roundstone (L 7241 O.S.I. ½" sheet 10), where we stayed for four nights. Praeger (7) records that *E. mackaiana* "has its headquarters at Craigga-more Lough, 4 miles NNW of Roundstone. From that place, it has been traced for a mile E and W and S across the wet bogs to Letterdife and (up to 600 ft.) on the hill of Urrisbeg where it may be seen mingling with *E. mediterranea* (*sic.*)..... occupying wet boggy valleys on the NW slope. It occurs again at Carna, 7 miles to the SE."

We lost no time the morning after our arrival in going over the "Bog Road" from Toombeola (L 7544) towards Ballinaboy (L 6648), stopping at Craigha Moira as Babington called it, or Craiggamore, as it is usually known, Pt. 201 (L 7245), a name which is not on the ½" O.S. map, and which Flavin had such trouble in finding. There, on both sides of the road, over the hill and round the lough to the NW of this hill, which Flavin called Lough Nabrackamore (L 7245), *E. mackaiana* is

plentiful, spreading in all directions by its shallow rhizomes. The hybrid, *E.* x *stuartii*, is there too, and there seemed to be more of this as one got further away from Craiggamore; no unusual colour forms of either were seen, but white *E. tetralix* was seen occasionally. Not far away, the Lesser Waterlily, *Nymphaea occidentalis* Moss was seen in a number of the loughs, as were *Lobelia dortmanna* and *Eriocaulon septangulare*, and in one piece of bog close to the road, all three species of Sundew were plentiful.

The first record of *E. mackaiana* is that its distinctiveness had been recognised by a local botanist, William M'Calla, the son of the hotel-keeper at Roundstone, who showed it to C. C. Babington at Craiggamore on the 2nd September, 1835. Babington, later Professor of Botany at Cambridge, considered it a new species, and included a description in a paper which he read to the Linnean Society on the 1st December of that year, suggesting the name *E. biformis* for it. Before he returned to England, he had left material of the heath at Trinity College, Dublin, for the Curator of the Botanic Garden, J. T. Mackay, who sent some of it to Dr. William J. Hooker, then Professor of Botany at Glasgow. Hooker mentioned this new heath in a short article in the *Botanic Magazine*, in which he suggested that it be named *Mackaii*, after Mackay. This article was published on the same day as Babington read his paper to the Linnean Society; Babington very reluctantly accepted that the plant should be named after Mackay but, as he had not been the finder, it became *E. mackaiana* Bab. (8)

On the 14th September, 1846, Thomas Fleming Bergin of Westland Row, Dublin, a Life Member of the Royal Irish Academy, and Secretary of the Dublin and Kingston Railway Company, alighted from his (outside) car while driving near Craiggamore and stumbled upon an unfamiliar heath close to the road, having stepped across a bank or wall. He picked some plants and showed them to William M'Calla, by then schoolmaster at

Ballynhinch, who identified them as *E. ciliaris*. The plants were sent to David Moore, Curator of the Botanic Gardens at Glasnevin, and a report by the editor, Edward Newman, was contained in the November issue of *The Phytologist*. Professor J. H. Balfour saw the plants in August 1852, and in later years both Babington and A. G. More looked for it, once with Balfour, but it was not seen again until Michael Lambert re-found it in 1965 (9. 10).

After showing me *E. mackaiana* at Craiggamore, my guides took me on towards Ballinaboy, and we stopped and alighted from our (motor) car (like Bergin), and stepped down a stone bank, to see a line of eight plants (clumps) of *E. ciliaris*, growing up through, and largely concealed by, *Molinia*. It flowers rather later here than in SW England, and the westernmost plant had two inflorescences on it, just beginning to open on the 13th August. We searched all round and saw no more, and no sign of *E.* x *watsonii*, although there was plenty of *E. tetralix*. *E.* x *stuartii* was also seen not far away, both east and west. I would think that this is undoubtedly the same colony that Bergin found, though the original localities are somewhat vague. It is surprising that Balfour did not see it when he went back, but at present it is certainly well concealed by the *Molinia*. It is curious that, untypically, it is eglandular, (11) though otherwise to the naked eye it is very typical *E. ciliaris* in appearance. Like the white *E. vagans* in Fermanagh, how did this Lusitanian species, so plentiful on the Isle of Purbeck in Dorset, and on boggy heaths near Truro in Cornwall, get there ? Is it a pre-glacial survival, or could it have been planted there, many years ago, in a straight line, by the side of the road ?

Daboecia cantabrica, St. Dabeoc's Heath, but why do we now spell its botanical name in this curious fashion? Babington and Praeger did not, and Gilbert-Carter (12) rightly said that Linnaeus had spelt it wrongly. Anyway, we saw this beautiful heath in a number of places in Connemara, never very far from the road or very high up the hills, growing with other heaths, sometimes locally dominant. We did not see any unusual colour forms, apart from two plants of the white form, indicated to us by Colonel Anthony Morris, growing among Bell Heather and Gorse and the normal-coloured form, on the east side of the road, not far from his home at Ballinaboy. Near L. Sheedagh at Carna, next day,cuttings were taken from a plant that Charles Nelson showed us, whose flowers had a markedly globose corolla with wide petaloid filaments and a split style, malformed rather in the same way as the *E. mackaiana* cultivar, 'Maura' (13), which was found not far away.

On our second day in Connemara, we visited Carna (L 7832) where we saw *Juncus planifolius* (14), the grass-leaved rush, reminiscent of a *Luzula*, naturalised in a ditch by the roadside, more or less opposite the school SE of the village. It is known in the Northern Hemisphere otherwise only in Hawaii and Oregon. Perhaps ¼ mile beyond this, over a rise in the ground, we turned down a track to the left (north), and walked over an area of very wet raised-bog between Pt. 118 (L 8031) and L. Sheedagh. This is the main Carna station for *E. mackaiana*, probably discovered there by A. G. More in 1874, and seen there by Miss Knowles in 1910,but not seen again until it was re-found by Professor D. A. Webb, Dr. G. Halliday and R. McMullen in 1969. It covers an area of about two acres, enclosed by granite outcrops, and contains *E.* x *stuartii* also, and the 'Maura' form of *E. mackaiana* with the fused petaloid filaments. Here *E. mackaiana* seems smaller and the flowers paler, and all the plants were eglandular, as also was a white *E. tetralix* found here. It is curious to note this variation of *E. mackaiana* from north to south. Going on from here,

back towards the school, we found another small group of *E. mackaiana* on the side of a rocky outcrop in a drier environment, the majority of which had petaloid stamens; this may have been More's original Carna station, as his specimen contained a high proportion of such flowers.

On our third day in Connemara, we picked up Colonel Morris in Clifden and met Mrs. Willoughby at Renvyle (L 6982), where we saw the enigmatic water weed, *Hydrilla*, in the lough (15). Mrs. Willoughby then took us to see an hitherto unrecorded patch of *E. erigena* by the side of the Culfin River flowing out of L. Muck south west of Salruck (L 7763). Across Killary Harbour to the north, we could make out the mass of this fine heather on the southern slops of Mweelrea (L 7866). That afternoon we took Mrs. Willoughby to see *E. mackaiana* and *E. ciliaris* on the Bog Road, after dropping Col. Morris at his home at Ballinaboy.

After this it was suggested that we should go and see *E. erigena* on Errisbeg (16), where Mackay saw it 150 years ago, even though it would not be in flower, and also look for *E. mackaiana* there and towards Letterdife, where Praeger had recorded it, though later observers thought it did not extend so far south.

So, we all started up the hill behind Roundstone and reached the saddle between the two peaks where, among other things, we saw *Juniperus communis* ssp. *nana* (*sibirica*) creeping over rocks and much grazed. Below, to the NW, we could see a line of dark bushes winding downhill, and on closer examination this turned out to be an extensive colony of *E. erigena*, growing in the well-drained ground either side of the streams flowing into L. Nalawney (L 6941). Except for one large patch half-way down which was rather yellow, possibly because the ground was boggier, for the most part this heath appeared to be in very good condition. As we got nearer the lough, we found *E. mackaiana*, growing sparingly on blanket peat with *E.* x *stuartii* and *E. tetralix*.

Next morning we returned, to approach L. Nalawney from below, by the track starting along the SW side of Errisbeg, and found *E. erigena* extending for about half a mile on both sides of the outlet stream with scattered patches of *E. mackaiana* around the lough and up the slope of the hill with *E.* x *stuartii* and *E. tetralix.*

Having found Praeger justified thus far, it was agreed to reconnoitre the NE shoulder of Errisbeg above Letterdife (L 7141), and we found a peat road, not marked on the map, over the shoulder, heading in the direction of Pt. 155 (L 7343). We took the car up this at about 5 mph, with one of the party on either side of the track, and came upon *E. mackaiana* in wet blanket bog within ½ mile of the hamlet of Letterdife. From there we traced it north towards Craiggamore till the track faded out; populations were found south and west of L. Doon and near the SE shore of L. Cam due west of Pt. 155.

This bears out more or less what Praeger wrote 46 years ago about the distribution of *E. mackaiana* in Connemara, but various observers in recent years have shown that it also extends further north and west of Craiggamore than Praeger had stated or than Webb's survey showed (17, 18). Visitors to the area will find themselves handicapped by the non-availability of a larger scale map than the ½" to 1 mile O.S. Sheet 10, Connemara, on which the names of few of these small loughs are marked.

From Roundstone, we drove down to the SW, to Killarney where the only heavy rain of our tour prevented us seeing *Arbutus unedo* (the Strawberry tree) in the wild, then to Tahilla on the Kenmare River, and after that over the lovely mountain road to Bantry Bay, and then up to Cork. In the course of this we visited the fabulous gardens at Adare, Rossdohan, Ilnacullin, Fota, Ashbourne House and Anne's Grove, with their wonderful conifers and bamboos. On the last day, I paid a visit with Charles Nelson to the SE corner of Ireland to see *Otanthus* (*Diotis*) *maritimus*, flourishing in its only remaining station in the British Isles.

For a fascinating fortnight, and for access to the various papers that they have both written on the riddles of the Irish heaths, I am greatly beholden to David McClintock and to Charles Nelson, who has written further details in an account for *The Irish Naturalists Journal* (18), with more to follow.

The map accompanying this article is from Dr. Nelson's paper (18) and is published here by kind permission of the Editor of *The Irish Naturalists' Journal.*

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Black Polythene Mulches

T. A. Julian, Whaley Bridge, Derbyshire

For many years gardeners have known of the virtues of black plastic sheet used as a mulch to suppress weeds and to inhibit moisture evaporation. Recently there has been an upsurge in interest in its use in horticulture, and in Norway, for instance, black polythene sheet has for long been used to mulch strawberry plantations.

The impervious nature of the sheet prevents evaporation of moisture from the soil that it covers, and, being black, light cannot pass through to the soil to stimulate the germination of weed seeds. The absorption of the Sun's radiated heat by the black sheet and its re-radiation into the plants when the Sun is obscured is thought to have a significantly beneficial effect on growth also. It is these benefits which make the use of polythene, in this way, so attractive as an aid to growing heathers.

More than twenty years ago I first used black plastic sheet in my garden. It was a means of avoiding the chore of earthing up potatoes. Twenty-four inch wide material was laid along the rows and the potatoes were planted at the usual intervals through slits in the sheet. The results were outstandingly good and considerable time and effort had been saved. Unfortunately a large number of small black field slugs were encouraged to colonise by the protective polythene cover and most of the potatoes were attacked. The soil was mainly sand and very sharply drained, and the plants had responded to the increased moisture content.

It was not until 1976 that I had occasion to use the black sheet again as a mulch. This time the suppression of weeds was the objective. The weeding team at Harlow Car had been unsuccessful in coping with the numerous weeds on the heather trial plot by conventional hoeing and hand weeding and it became apparent that, with so

few helpers a less labour intensive method had to be found. Two trials were instituted; the application of a persistent soil herbicide - Casoron G - , and a mulch consisting of 12 inch strips of black polythene sheet laid along each side of a row of heathers that had been planted during the previous year. At the end of the season each had proved successful in suppressing the germination and growth of weeds. For reasons of cost and convenience it was decided to use Casoron on the whole plot the following year. 1976 was a year of severe drought, but despite this the mulched plants grew normally when others of the same batch, that had been planted nearby at the same time, showed signs of acute distress. The mulch was left in position and in the following years comparisons of mulched and un-mulched plants dramatically demonstrated the benefits of black polythene mulching. The Weed Research Organisation in their booklet *Chemical Weed Control in Your Garden* comment on the effects of polythene mulching other than on weeds as follows:- "There appear to be beneficial effects, not yet fully evaluated, all of which encourage vigorous growth and more reliable establishment of transplanted stock".

A polythene sheet laid on the surface, between the plants, is unsightly and subject to disturbance by wind, but if covered with a thin layer of soil these disadvantages disappear. This year I polythene-mulched a kidney-shaped heather bed in my garden. In it were 65 three-year old *Calluna* plants of coloured foliage cultivars. A layer of soil of not more than one inch thickness was removed from the surface between the plants, taking care not to take it from the roots, the perennial weeds were dealt with, and strips and rectangles of polythene were laid between and around the plants, each piece overlapping the adjacent piece. The soil was replaced evenly over the polythene which was obscured completely. One could not detect a difference between "before" and "after". The bed rises towards the centre and in consequence subsequent heavy rains uncovered

some high spots of polythene which, however, were not objectionable.

So far, no weeds have appeared but it is expected that a few seeds will germinate. They are unlikely to develop, as the moisture will evaporate from the thin layer of soil after a few days without rain. From my short experience with this experimental bed it is apparent that polythene mulching will look untidy on sloping land but achieves its object unobtrusively on the flat.

Observations of Lime Sensitivity in Young Plants of some *Erica, Calluna* and *Daboecia* Cultivars.

Dr. J. Griffiths, Garforth, Yorkshire

During the summer of 1979 a modest programme of heather propagation was undertaken, and cuttings of several of the more popular cultivars were successfully struck by early autumn. The cuttings were overwintered, and then potted on in mid-April of the following year. The potting-on compost was prepared from fine moss peat (2 parts), lime-free loam (1 part), perlite (1 part), and gritty sand (1 part). At the time I had reason to believe that the sand was lime-free, but after noting certain peculiarities in plant growth during subsequent months, a closer investigation was undertaken, only to reveal that in fact the sand was particularly high in lime content.

Although unfortunate from the propagating point of view, this mischance did enable me to make some observations on the relative sensitivities under controlled conditions of various cultivars to lime in the growing medium. All the plants involved had healthy root systems and foliage at the potting-on stage, and were grown on in a cold greenhouse between mid-April and the end of August, 1980. The pH of the rooting mixture was between 7.8 and 8.0.

The first comment to make concerns the somewhat surprising insensitivity of the initial rooting process to pH of the medium, since all the cuttings were struck in a 1:1 mixture of peat and the same limey sand. The healthy condition of the rooted cuttings after overwintering in this medium, admittedly a period of minimal stem growth, suggested that pH intolerance may only manifest itself during the growth of cuttings that involves photosynthesis in the leaves.

Subsequent growth of the plants during the spring and summer showed markedly different results, however, and it was soon evident that certain cultivars were suffering inhibition, whereas others were progressing with vigour. After observing the behaviour of the plants during the April to August period, I was able to assess the relative effects of the alkaline growth medium on various plants, and the results are summarised in the accompanying Table. In no case were less than four plant samples of each cultivar used for this survey, so that growth rate variations could be safely ascribed to pH sensitivity, and not to other cultivational variables. For convenience, I have rated the relative lime sensitivities of the listed plants on an arbitrary scale of 0 - 3, where a value of 0 denotes no perceptible effect of lime on growth, 1 indicates a moderate inhibition of growth, 2 a severe inhibition, and 3 indicates that the plant failed to survive during the growing-on period. Assessments were made by considering the degree of abnormal foliage colour, distorted leaves and stems, and low overall growth rate.

Although the data of the Table show no real surprises, certain points are worthy of comment and may indicate the way for further experiments of this kind. In addition to the lime-insensitive *Erica carnea*, *E. erigena* and *E.* x *darleyensis* cultivars, the *E. vagans* varieties came out equally well under these conditions. H. Street in his article "Living with Lime" (*Heather Society Year Book*, 1979, p.17) has also noted a lime tolerance in this species somewhat better than is generally expected.

Daboecia varieties also proved interesting, in that *D. cantabrica* 'Polifolia' and 'Alba' showed no lime sensitivity in these tests, whereas *D.* x *scotica* 'William Buchanan' and ;'Jack Drake' were severely affected. It would seem that these hybrids inherit the lime sensitivity of the *D. azorica* parent, but curiously not the tendency to climatic tenderness of that species. The usefully low pH sensitivity of some *D. cantabrica* cultivars under garden conditions has been noted previously by Jones (Observations on Lime Tolerance, *Heather Society Year Book*, 1977, p. 40).

In the case of *Calluna vulgaris* cultivars, the expected high lime sensitivity was observed, but interesting differences between certain cultivars were detectable. For example, 'County Wicklow' proved particularly susceptible. The varieties 'H. E. Beale' and 'Peter Sparkes' proved somewhat less lime sensitive, but this may be attributable to their more vigorous growth characteristics. 'Sister Anne', 'Dainty Bess' and 'Golden Carpet' fared much better, however, and showed a usefully low sensitivity, at least in comparison with other members of the series.

These results raise the interesting question of possible variation in lime tolerance between cultivars of a particular species, and it would seem that further experimental work along these lines could be rewarding, especially for those heather enthusiasts with problem soil conditions. Who knows ? Perhaps those evolutionary factors that have provided us with such a wide range of colourful cultivars might also be exploited to give new varieties with improved lime-tolerance properties. As a tentative example of how this might be achieved, I can describe a simple experiment that was carried out in parallel with those already mentioned. In the late summer of 1979, some twenty seedlings from *C. v.* 'Mullion' were potted on in the same compost mixture as that described earlier. During the following months several seedlings dwindled and eventually died, until by September, 1980, only eleven remained. Of

these, only four were reasonably healthy, and will be transferred to new containers for longer term observation. Obviously with such a small sample number, it is unlikely that any significant variations in lime tolerance will be found, but similar selective trials with large numbers of seedlings could be profitable.

As a footnote, I might add that all the plants raised from cuttings that were subjected to the earlier mentioned growing conditions have now been re-potted in lime-free compost. The plants showing poor growth were also watered with ferrous sulphate solution, and after one month's growth, all are now in a much better condition, and will be suitable for planting out in the spring of 1981.

Lime sensitivity of various cultivars

Calluna vulgaris	
'Dainty Bess', Golden Carpet', 'Sister Anne'	1
'J. H. Hamilton'	1 - 2
'Alba Plena', 'Alba Rigida', 'Blazeaway', 'H.E. Beale', 'Mullion', 'Peter Sparkes', 'Tib'	2
'Californian Midge', 'County Wicklow'	3
Daboecia cantabrica	
'Alba', 'Polifolia'	0
Daboecia x *scotica*	
'Jack Drake', 'William Buchanan'	2
Erica carnea	
'Carnea', 'King George', 'Myretoun Ruby', 'Springwood Pink', 'Springwood White'	0
Erica erigena	
'Irish Dusk', 'W.T. Rackliff'	0
Erica tetralix	
'Alba Mollis', 'Con Underwood'	2
Erica vagans	
'Pallida', 'Mrs. D.F. Maxwell'	0
'Valerie Proudley'	0 - 1
Erica x *darleyensis*	
'Silberschmelze'	0
Erica x *stuartii*	
'Stuartii'	1 - 2
Erica x *watsonii*	
'Dawn'	2
Erica x *williamsii*	
'P.D. Williams'	3

The Slide Library

Over the past year, Neil Brummage and David Small have been reviewing the Society's Slide Library. In the past, members requesting slides from the Librarian often did so by asking for specific types of slides, rather than asking for Box A or Box B. Thus the review that has been undertaken, was not only to improve the quality of the slides, but also to categorise them into modular blocks, often asked for in the past, so that members need only ask for slides pertinent to their talks. The new modules are as follows :-

Module 1 - Wild Heathers

This module shows a cross section of wild heather sites and some close-ups of the native species. We hope that this module will, in time, contain examples of all species from the Northern Hemisphere.

Module 2 - Diversity of Heathers

A range of slides, showing the different habits, foliage and flower colours etc.

Module 3 - Garden Design

This module shows designs of small and large gardens, including some design features to avoid. It should, in time, contain slides on the preparation of beds and after care.

Modules 4 to 7 are collections of named heathers, usually depicting single mature specimens. We are so short of slides of this type that we are unable to subdivide further than the rather broad classes set out below.

Module 4 - Callunas

Module 5 - Summer - flowering Heaths

Module 6 - Winter - flowering Heaths

Module 7 - Cape Heaths

Module 8 - Botanical. A collection of slides showing schizopetalous, fissa forms etc., close-ups of corolla, roots etc., and sports.

Module 9 - Miscellaneous.

Slides depicting propagation, exhibiting, diseases, trials and other plants that can be associated with heathers.

Modules vary in size from 5 to a maximum of 20, depending on the topic and the availability of slides. The following are examples of how the modular system will work.

a). For a talk in an area where the soil will not readily permit Callunas and cinereas to be grown Modules 1, 2, 3, and two of Module 6 could be used to emphasise the use of Winter-flowering heaths in such areas.
b). A member giving a talk to other members, might well request Modules 3, 2 x 4, 2 x 5, 2 x 6, 7, 8, and 9.

If in doubt, request one Module of each or, better, tell the Slide Librarian the subject of your talk, giving some idea of your audience, and he will advise.

All slides are being reframed, to overcome the difficulty with focusing which has sometimes been encountered in the past, and a brief "scenario" is being prepared on each slide to help members giving a talk for the first time. The packaging is also being changed to minimise postage, each Module being housed in a small plastic slide box. These are then placed in a Jiffy bag for safe transit through the post.

Finally, the Society is very short of good quality slides, as has been mentioned above. If you feel that you can donate any slides, please write to the new Slide Librarian, David Small, to whom very special thanks are due for so much trouble.

New Acquisitions

J. Platt, Ulnes Walton, Nr. Leyland, Lancashire

In his previous lists Jack Platt has described 93 recently introduced cultivars. This year he adds another 17 which have found their way into his garden during the past year. Perhaps the flow is slowing down somewhat, but his enthusiasm does not wane. He has collected plants from as far afield in the British Isles as Perthshire, Cornwall and Suffolk, and also lists some new Dutch cultivars.

We have continued the practice of giving, in parentheses, the sources of earlier publications of the names, where known. Thus (P.G., p. 31) indicates that the name may be found on page 31 of the *Pocket Guide to Heather Gardening*, 4th edition. Ed.)

Calluna vulgaris

'Allegro' Aug. - Oct.

50 cm. This plant arose as a seedling, reputedly from **'Alportii Praecox'**. It has ruby (H5) flowers which are borne on long spikes, making it an outstanding plant. It was introduced by P. Bakhuyzen of Boskoop (P. G., p. 30).

'Anne Dobbin' Aug. - Sept.

This minute prostrate plant was found by Mrs. Eileen Porter prior to 1975. The foliage is dark green and the flowers are pink. It was introduced by Mr. P. J. Foley of Holden Clough Nursery, Lancs. and was at first called **'Minnie'.**

'Applecross' Sept. - Oct.

50 cm. A double with rose pink (H7) flowers and dark green foliage. The flowering stems are long and tapering without lateral racemes. This, coupled with the broad erect habit gives the impression of a greater daintyness than *C. v.* **'Peter Sparkes'.** It was found at Applecross by J. Mair in 1971, and introduced by P. G. Zwijnenburg of Boskoop (P. G., p. 30).

'Dickson's Blazes' Aug. - Sept.

The most outstanding feature of this plant is its spreading foliage which is flecked with cream in the spring and summer. The flowers are pink (H8). It arose as a seedling, reputedly from *C. v.* **'Olive Turner'** and was known by 1976. It was raised and introduced by R. J. Brien. (*Heather Society Year Book*, 1979, p. 56).

'Guinea Gold' Sept. - Oct.
This is probably the most vigorous of the white flowered, golden foliage Callunas and, so far, appears to be very impressive. The foliage, in spring and summer, is somewhat lighter than that of *C. v.* **'Beoly Gold'.** The habit is erect. It was raised by J. W. Sparkes before 1977.

'Hilbrook Orange' Aug. - Sept.
30 cm. An orange-red foliage plant with mauve (H2) flowers, and is more compact than *C. v.* **'Robert Chapman'**. It arose as a seedling in 1977 in Mr. and Mrs. Brooks' Little Park Nursery, Suffolk.

'Marion Blum' Aug. - Sept.
45 cm. This vigorous cultivar has white flowers borne over yellow-green foliage in summer. In the winter the foliage turns completely yellow. It is similar to *C. v.* **'Christina'**. It was raised by Mr. H. J. M. Blum of Steenwijkerwold in 1974 and introduced by P. G. Zwijnenburg of Boskoop. (*Heather Society Year Book*, 1979, p. 55).

'Pepper and Salt' Aug. - Sept.
40 cm. This plant has light purple-rose flowers. The foliage is tipped with cream in the spring, and the habit is erect. (P. G., p. 32).

'Rosebud' Sept. - Oct.
This is a nice prostrate plant with pink (H8) flowers and gold summer foliage. It was found by Mr. and Mrs. Clegg of Truro and was introduced by Mr. Dungey of Felsberg Nurseries, Dobwalls, Liskeard, Cornwall.

'Winter Fire' Aug. - Sept.
This broad spreading plant carries its purple-rose flowers over orange summer foliage. During the winter the foliage turn to an intense red. It was raised by S. W. Bond, now of Hartpury, Gloucestershire in 1970. (P. G., p. 32).

Daboecia cantabrica

'Barbara Phillips' June - Nov.
This very floriferous plant has amethyst (H1) flowers, which it carries over dark green foliage. It arose as a seedling in Peter Davis's Nursery and was named by him in 1976 after the wife of Brigadier C. E. Lucas Phillips. (P. G., p. 33, *Heather Society Year Book*, 1979, p. 57).

Erica carnea

'Winter Gold' Feb. - April
As the name suggests, this is a foliage plant. The gold foliage is somewhat brighter than that of *E. c.* **'Altadena'**. The flowers are pink (H8) and it has a spreading habit. It arose as a seedling in Parsons Nursery at Woolhampton, Berkshire.

'Winter Melody'
Mr. Parson also raised this plant. It has pink flowers, mid-green foliage and a vigorous spreading habit.

Erica cinerea

'Blossom Time' June - Sept.
25 cm. This is a low-growing, broad, spreading plant. The flowers are pink and appear early in the season. David McClintock has traced this plant back to Hardwicks of Newick, Lewes, Sussex *circa* 1963.

'Little Anne' June - Oct.
This plant has a low, close habit and is very slow growing. The bright purple (H10) flowers literally cover the plant over a long season. It was found by Mrs. Eileen Porter prior to 1975 and was named after her grand-daughter. It was introduced by Mr. P. J. Foley of Holden Clough Nursery, Lancs.

'Next Best' Aug. - Sept.
40 cm. This arose as a sport on *E.c.* **'C. G. Best'** in David McClintock's garden in 1971. It has rose pink (H7) flowers. It is a curious plant with red tips to the new growth. Some stems are half yellow and half green, while others appear smokey. (*The Garden*, May 1980, p. 195).

Erica vagans

'Valerie Smith' Aug. - Oct.
The large white flowers of this plant are freely borne over dark green foliage. It has a compact habit. It has been known since 1970. (P. G., p. 36, *Heather Society Year Book*, 1979, p. 57).

Personal and Place Names Used for Hardy Heathers: Second Supplement

David McClintock, Platt, Kent.

It has been suggested that we should have a supplement to these lists every two years, hence this short one. I like also to think that it reflects the welcome fact that fewer new heathers are being dowered with names without proper comparison and testing. But at least one of those below should never have been given a name at all, and is now hopefully, dead.

The five starred names have been duly registered. It is much to be regretted that none of the others have been, so far.

It has still proved impossible to get the promised comments from South Africa on the draft lists of their heaths, which total some 260 personal and 60 geographic names.

PERSONAL NAMES

Anne Dobbin (*Calluna*) Grand-daughter of Eileen Porter, pre 1975

Little Anne (*cinerea*) Same person as Anne Dobbin, again pre 1975

Anna (*Calluna*) Mother of K. Kramer of Süddorf, Germany

Annemarie (*Calluna*) Nobody in particular

bianonis (*multiflora*) F. Bianon

Karin Blum (*Calluna*) Second daughter of H. J. M. Blum of Steenwijkerwold, Holland.

bocquetii (*Erica* (*Pentapera*)) Prof. Gilbert Bocquet of Geneva.

Olive Cowan (*Calluna*) Mrs. Cowan of Petherton, Temple Close, Moor Park, Farnham, Surrey.

J C. Fletcher (*vagans*) Heather foreman from R. V. Rogers at Pickering, Yorks.

Michael Fletcher (*Calluna*) Son of J. C. Fletcher

Lionel Fortescue (*lusitanica*) Ex Eton Master, of Buckland Monachorum, Devon.

Louise Fortescue (*lusitanica*) Error for the last name.

Harry Gibbons (*Calluna*) On staff of R. V. Rogers of Pickering.

Kees Gouda (*Calluna*) of Utrecht, finder in Spain

Hilletje (*carnea*) Wife of finder, Verwerj of Boskoop.

Emerald Jock (*Calluna*) K16. Jock Nimlin, gem collector and field officer on St. Kilda.

kruessmaniana (*cinerea*) G. Krüssmann (1910 - 1980)

Mirelle (*Calluna*) Eldest daughter of J. Westdijk of Boskoop.

Audrey Morris (*carnea*) Employee at Simpson's Nursery, Knutsford.

*David Platt (*Calluna*) Son of J. Platt of Ulnes Walton, Lancs.

*Ruth's Gold (*Tetralix*) Wife of J. Platt.

Sonja (*Calluna*) Daughter of Herr Westendorf.

Victoria (*Calluna*) (At Edrom Nurseries long before 1979).

PLACE NAMES

* Cottswood Gold (*Calluna*) Name of the Turpins' house at West Clandon, Surrey.

Eshaness (*Calluna*) Parish in Shetland.

*Godrevy (*cinerea*) Godrevy Towans, Cornwall.

Hilbrook Orange (*Calluna*). Invented name. Little Park Nursery, Park Hill near by.

Holehird (*australis*) Lakeland Horticultural Society's garden outside Windermere.

Laphroig (*Calluna*) Islay, Scotland.

Lüneburg Heath (*Calluna*) N. Germany.

Tybesta Gold (*carnea*) Parish in Cornwall

*Westwood Yellow (*carnea*) Westwood Road, Windlesham, Surrey, where Foxhollow Nursery was.

Wittmoor (*Calluna*) Place on outskirts of Hamburg.

AMELIORATION

Delete Foxhollow (*Calluna*) 1974.

"Au revoir" in "Down Under"

Mrs. Anne Parris, Usk, Gwent

Or should I say "Auf Wiedersehen" as our Society becomes more and more international.

Whether or not, at my age, I succeed in making a new heather garden on another bank below the house I plan to build in a corner of my son's grassland in Australia, I do not know. Nearby there is a small spinney of *Eucalyptus* and tree fern. I visualise too, clumps of white barked birch and red barked *Eucalyptus*; a pipe dream perhaps. At least I learn that some heaths and heathers are obtainable. If I don't like them, maybe I can now "induce" some more!

As in the U.S.A., the Australians use a precautionary sterilant which is largely lethal to introduced plants and cuttings; even if they survive the freezing conditions inside airline luggage compartments.

The Australians are right of course to be cautious. Many plant "rabbits" were introduced before they realised; like docks and brambles, and the picturesque relation of Vipers Bugloss, known respectively as "Salvation Jane" or "Paterson's Curse", depending on whether it is fodder in times of drought, or a wretched weed of arable land. The Latin name of this plant is *Echium plantagineum* (*lycopsis*).

Before I finally take my leave I must tell you of an odd coincidence. In the last century my maternal grandfather was President of the Schleswig Holstein "Heide Kultur Verein", not as you might expect to encourage the growing of heathers, but for the reclamation for farming of vast areas, at that time, of sandy heathland.

So goodbye everybody, till next time ! I shall sadly miss all the friends I have made through the Heather Society.

Recent Writings on Heathers, 1980

Anon., Hardiness of *Erica* and *Calluna*, *Gardeners Chronicle*, 1980, Vol.187, No.13. p 13
A belated summary of Sakai and Miwa's paper.

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8,000 heathers shown, numerous medals given them at this great Swiss show, all but five for *E. gracilis*.

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"Non sono delicate le Eriche" - but nine "enemies" are discussed.

Amos, G., Millionaire's Garden, *Garden News*, 1980, May 3rd, p 39
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Appreciation of his visit to the Weymouth Conference and seeing *Erica ciliaris* 'Egdon Heath'.

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The value of saving all seedlings to see how they turn out.

Davidson, M., The easy way to beat winter gloom, *Sunday Express*, 30th Dec. 1979
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Introductory notes by the Assistant Curator of the Edinburgh Botanic Garden.

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A descriptive study.

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In addition, there have been excellent articles in our contemporaries *Ericultura, Der Heidegarten* and *Heather News.*

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